

THE MIDDLETON AND ELIZABETH REEFS, SOUTH PACIFIC OCEAN.

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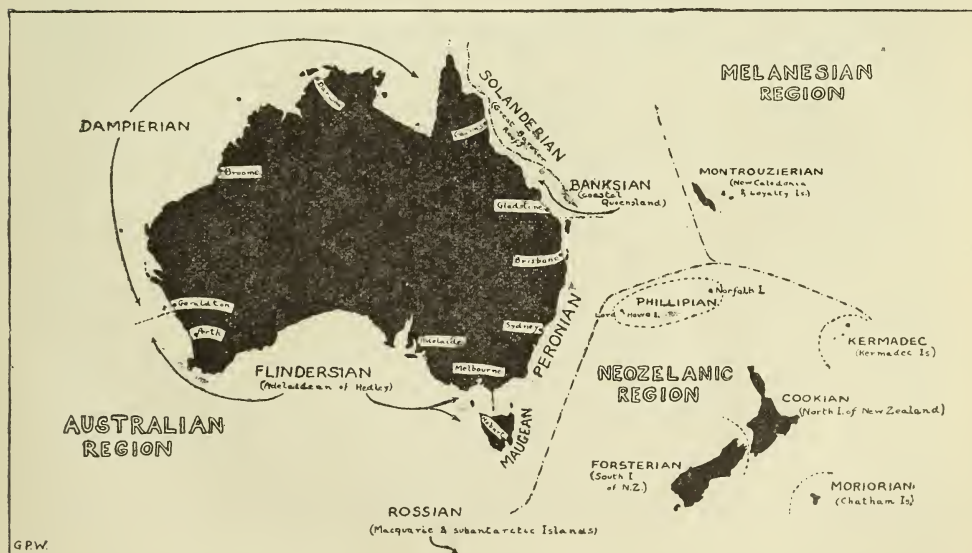
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The reefs lie in the Phillipian province, north of Lord Howe Island.

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SITUATION OF THE REEFS AND HISTORICAL ACCOUNT.

Surrounded by unbroken leagues of open sea in a part of the Pacific some three of four hundred miles from the coast of New South Wales lie the Middleton and Elizabeth Reefs, the loneliest islets in the whole world. Even the term islets, implying land, is probably a misnomer, since the storm-lashed Tasman Sea may break entirely over the tiny sand or shingle-banks which rise from their coral ramparts, or wash the battered wrecks which alone afford footing for the rare visitors to these desolate atolls.

Not a tree or a shrub can here exist, for there is no soil and no fresh water, and the only inhabitants are the sea birds which rest awhile after long ocean flights.

Birds such as these suggested to La Perouse, as he proceeded from Samoa to Botany Bay in 1788, the idea that land or reefs might exist in the vicinity of Lord Howe Island and its satellite reefs and islets, whose existence it remained for the Englishmen of the First Fleet to prove later in the same year.

Middleton Reef was discovered by Lieutenant John Shortland (1736-1803), who, after a varied naval career, came to Australia with the First Fleet in the *Alexander*. On his way back to England he sighted many unknown islands and reefs and, in an account of his voyage is recorded the following,* under date July 20, 1788:—"About noon this day, the men at the masthead discovered a very extensive shoal on the larboard beam, bearing from north by west to west by south, distant between two and three leagues. It trended north by east and south by west, and was judged to be in length about three leagues and a half. The breadth could not be ascertained, for, while the ship ran along it, the sand bank was seen to extend as far as the eye could discern. It lies in latitude 29 deg. 20 min. south, and in longitude 158 deg. 48 min. east, and was named by Lieutenant Shortland, *Middleton Shoals*".

The next day, Shortland discerned what he thought was an island with a remarkable peak. This he named Sir Charles Middleton's Island, but later surveyors were unable to find land in the situation he indicated. Since Shortland's chart, published in Phillip's *Voyage*, shows that he was not very sure of his positions in those waters, it seems that Shortland must have drifted to within sight of Lord Howe Island. "Returning to London he strongly urged the Admiralty to have the eastern coast of Australia thoroughly surveyed and charted, and was thus partly responsible for the despatch of Matthew Flinders in 1799. He died at Lille in France in 1803" (W. Jeffery, *Austr. Encycl.*, ii., 1926, 461-462).

Sir Charles Middleton (1721-1813) was Comptroller of the Navy from 1778-1790, and thus during the time of the First Fleet. He became an Admiral in 1795, was elevated to the peerage as Lord Barham in 1805, and died 17 June, 1813. (*Hist. Rec. N.S.W.*, v., 560 and 647.) Governor Hunter sent Middleton some specimens of Australian birds. (*Hist. Rec. N.S.W.*, iii., 75.). He is apparently the Charles Theodore Middleton who compiled "A New and Complete System of Geography", published in London in 1779.

Soon after Lieutenant Shortland's discovery, the *Golden Grove* also encountered Middleton Reef, since a despatch sent by Governor Arthur Phillip to Secretary Stephens, dated Port Jackson, November 16, 1788, reads as follows:—(*Hist. Rec. N.S.W.*, i., 2, 1783-92 (1892), 215.)

*The Voyage of Governor Phillip to Botany Bay, 3rd ed., 1790, 259.

"The *Golden Grove* returned from Norfolk Island the 10th instant, having landed the provisions and people. In her return they fell in with a dangerous reef, on which the sea broke very high. The south end of the reef only was seen, which, by Mr. Blackburn's account (the master of the *Supply*), is in the latitude of 29 deg. 25 min. S., longitude 155 deg. 59 min. E. (Footnote: Middleton Reef named after Sir Charles Middleton, Comptroller of the Navy. The 'Directory of the South Pacific Ocean' gives the latitude of the 'west elbow' of the reef 29 deg. 27 min. 40 sec. S., and the longitude 159 deg. 3 min. 38 sec. E.) It extended from N.E. by N. to north, but the weather did not permit him to examine how far it extends to the northward. They were, when the bearings were taken, four leagues from it, with light airs of wind. It shall be examined in the course of the summer."

A later despatch from Governor Phillip to Lord Sydney was dated Sydney Cove, February 12, 1790. (Hist. Rec. N.S.W., i., 2, 1783-92 (1892), 295, and note.)

"The *Supply*, after landing the people and provisions, had orders to go in search of the reef seen by the *Golden Grove*, store-ship, and a shoal or island which Lieutenant Shortland informed me (by the *Sirius*) he had seen in the passage to the northward. The *Supply* cruised for several days in the latitude and longitude in which Lieutenant Shortland places the island, but returned without seeing it. There is some reason to think that a mistake has been made as to the latitudes in which the island and shoal are placed by Lieutenant Shortland. . . .

"The *Sirius* is now under repair; and, when ready for sea, I shall send that ship and the *Supply* to determine the situation and extent of the shoals and the island."

(A footnote speaks of the mythical island 28 deg. 10 min. S. by 159 deg. 50 min. E., and the Shoal 29 deg. 20 min. S. by 158 deg. 48 min. E. (Shortl.) . Search was afterwards made for the islands, etc., in the schooner *Francis* and by Ball, but without success. Middleton Island was mentioned as late as 1840 in Polack's "New Zealanders.")

ELIZABETH REEF.

This reef is some 30 miles to the southward of Middleton Shoals, is 95 miles from Lord Howe Island, and nearly 300 miles east of Cape Byron, New South Wales (Yule, The Australia Directory, 6th ed., 1907, 540). Its position is given as 29 deg. 55½ min. S. by 159 deg. 2 min. E., whereas that of Middleton is 29 deg. 28 min. S. by 159 deg. 4 min. E. Elizabeth Reef was named after a brig of that name which was wrecked there in 1831. Findlay's Directory of the South Pacific Ocean (ed. 5, 1884, 966) states that the Elizabeth Reef (also known as Seringapatam Reef, Clark Reef, or Eliza Reef) was discovered by the ships *Claudine* and *Marquis of Hastings* in 1820. However, this reef was evidently discovered even earlier, by the 300 ton whaler "Britannia" (Amiel Hussey), which was wrecked there in August, 1806, whilst on its way from California to Sydney with 200 tons of sperm oil. (Hist. Rec. N.S. Wales, vi., 1806-1808 (1898), 125 and 192.) The depositions of her officers, recorded on their arrival in Sydney, suggest that what is now known as Elizabeth Reef was the last resting place of their vessel. The Reef was referred to as Golden Grove Shoal in the "Sydney Morning Herald" of June 9 and 16, 1869.

Indeed, shipmasters steered well clear of the Elizabeth and Middleton Reefs, and yet they became known as graveyards of the Pacific, for wreck

after wreck was piled upon their coral, and derelict vessels from miles away were converged by currents upon these treacherous shoals.

Captain J. H. Watson, who was for many years identified with shipping interests in Australia, has compiled lists of the wrecks known to have occurred on Middleton and Elizabeth Reefs. In a series of articles on "Ships of Long Ago" in the "Scottish Australasian" (vii., October, 1916, 5048-5054), Captain Watson states:—

"In a long course of years Middleton Shoal is accountable for numerous wrecks, and is, in fact, an ocean cemetery. In 1859 the schooner *Shamrock*, Captain Punch, passed Middleton Reef, for such he says it is, with rocks standing from four to five feet out of the water at low tide, on which at all times the seas break heavily. There were then the remains of three vessels lying there, the schooner *Agnes Napier*, the ships *Defender* and *Constitution*. In 1866 the barque *Mary Lawson*, from Newcastle to Shanghai, was totally wrecked on June 10, when the captain, his wife, and nearly all the crew perished.

"Another wreck about this time was the barque *Ramsay*, from Brisbane to London. Coming to more recent times one of some prominence was that of the Greenock-owned barque *Annasona*, a vessel of 1,373 tons register, commanded by Captain G. H. Blackstock, which on a voyage from Newcastle to Callao in ballast, early in the morning of January 18, 1907, crashed right on top of the noted reef, there to stay as long as she will hold together, and, being built of steel, that will probably be for some years. She was formerly the *Margaret A. B. Carswell*, built at Glasgow in 1892. By latest accounts she was standing upright on the reef. The only satisfactory thing about the loss of the *Annasona* was that all the crew were saved.

"Not so fortunate was the Norwegian barque, *Errol*, that met her fate on the reef on June 18, 1909, at midnight. The *Errol*, originally the *Carisbrooke Castle*, was on a voyage from the South American coast to Newcastle, and the captain appears to have lost his reckoning, and as the weather was such as to prevent him taking the sun, all that could be done was to keep a good look out; but that did not prevent him from seeing his ship crash on to the reef, and, as a heavy sea was breaking on it, in a couple of hours she broke in two. What followed is one of those incidents which every now and then send a thrill of horror through the community. On the ship at the time of the disaster was the captain, his wife, and four young children, and sixteen others, officers and crew. The chief officer and two seamen were washed over the side and drowned when she broke up. In the attempt to launch a raft a few days later the captain and second mate were drowned. Days wore on, and, as starvation stared them in the face, the poor mother thought hungry eyes were cast on her children, and these disappeared at night. Then the distracted mother died. One by one others succumbed, and when the wreck was seen by the captain of the s.s. *Tofua* there were but five of the crew alive, and these were on a roughly-constructed punt or raft inside the lagoon of the reef. Three months later, and not a vestige of this 1,500 ton barque was to be seen.

"But the Middleton Reef does not stand alone as a menace to shipping in this locality, for the Elizabeth Reef is perhaps responsible for more shipping casualties, and the two were in the early days often regarded as one and the same. This reef, which is situated only thirty miles south of the Middleton Reef, has been known at various times as the Seringapatam Reef, Eliza Reef, and Clark Reef; and Findlay's Directory

of the South Pacific Ocean says it was discovered by the ships *Claudine* and *Marquis of Hastings* in 1820. It also states it is 350 miles from the Australian coast and has proved fatal to many vessels. There is no question about the latter statement being correct, but about the date of discovery there is room for doubt.

"In the Historical Records of New South Wales are the depositions of the officers of the whaler *Britannia*, which was totally lost on a reef on August 24, 1806. It is therein stated that by an observation taken that day at noon the latitude was 30 deg. 38 min. South, and the course steered by compass from noon was West until 8 p.m., at the rate of 4 knots an hour [sic]; and north-west at about the same rate, until 2 a.m., when breakers were discovered ahead. The longitude was by lunar observation at 3 p.m. 156 deg. 40 min. East; and by reckoning 157 deg. 40 min. East.

"Findlay gives this reef as 29 deg. 55 min. South and 159 deg. 6 min. East; this closely corresponds to the survey by H.M.S. *Fly* in 1850, of the Middleton Reef. On which, therefore, was the *Britannia* lost, the depositions do not say, but a footnote in the records infers it was on the Elizabeth Reef. . . . How many vessels have been lost on this reef no one can say, for no record has been kept, but there must have been many before the correct position was given it on the charts.

"In 1850 the Sydney-owned barque *Rosetta Joseph*, of 265 tons, under command of Captain Patrick, was returning to Sydney from San Francisco, when, on the night of December 1, she struck a reef 'known as Clark's or Elizabeth's Reef'. All hands embarked in the boats, and laid at anchor all the next night. On the 3rd three boats, with 47 persons, crew and passengers, set sail for Lord Howe Island, having a north-east wind. The unfortunate castaways experienced a most trying time, the weather being tempestuous, with mountainous seas, which threatened on several occasions to engulf them. Not being able to make Lord Howe Island, they bore away for the coast and made Port Macquarie on the 10th, having been seven days on the passage. Here they were received with lavish hospitality by the residents. The vessel was sold by auction in Sydney for £105 and the schooner *The Bride* was sent to the reef to recover what fittings and cargo could be brought away. The vessel was found entire, but three whalers had visited her before the salvor reached her, and freely helped themselves, so there was little left to bring away. She remained high and dry, on the higher part of this reef for some years, acting as a beacon, and place of refuge also, until in 1858, the captain of the barque *Elizabeth Swift*, landed his crew and burned her for the sake of the copper bolts, which was considered by mariners as a thoughtless act, depriving them of what she had acted as.

"The barque, *Tyrian*, 226 tons, a Scarborough-built vessel, was, in 1851, whilst commanded by Captain Robinson, on a voyage from Honolulu to Sydney, via Auckland, and, leaving there on November 6, did, without any warning, about 2 o'clock in the morning, strike heavily on the Elizabeth Reef and there remain fixed.

"At daylight it was found she was close to the *Rosetta Joseph*. As there was no possibility of getting her off, and there were not sufficient boats to carry the forty-seven people she had on board, it was decided to send the long-boat away for assistance.

"Eleven passengers, the chief officer, and two seamen, with Captain Birkenshaw (a passenger) in charge of the boat, left in her, and reached Newcastle in a week, encountering very bad weather. Thirty-three persons

were left on the ship, and to bring them away H.M.S. *Acheron* left Sydney on December 5. In the meantime, the ketch *Aeolus*, on her passage from Fiji, sighted the wreck on the 4th, and, sending a boat to her found eight seamen, four passengers and the captain on board. Of these, three seamen and four passengers accepted the offer to be taken to Sydney. From them he heard that the whaler *Jane* had taken off fifteen four days previously. The *Acheron* duly arrived and took off the captain and the remaining seamen. The barque shortly after slipping off the reef and disappearing. In 1857 the whaler *Packet* was lost on this reef, and, as usual, the crew had to take to the boats, and after trying experiences reached Brisbane.

"A small, obsolete steamer, which has been for many years a conspicuous object, moored to a buoy in Snails Bay, has a history which in one aspect associates her with the Elizabeth Reef. In this wise, on the morning of May 8, 1869, the barque *Douglas*, Captain Sayers, two days out from Newcastle, bound to China, was hurled by a heavy sea right on top of the reef. The captain, thinking she would soon break up, had a raft constructed, on which all the crew left her. Some days after they were picked up by the *Storm Bird*, a Sydney-owned schooner, and taken into Newcastle. The captain, on arrival, stated he had seen another vessel on a reef when drifting about on the raft. To verify this statement the Government steamer *Thetis*, which is the obsolete vessel alluded to before, was sent, having on board Lieutenant Gowlland, R.N., of the Admiralty Survey. This officer came to the conclusion that Captain Sayers saw his own vessel on the Elizabeth Reef and failed to identify her. The *Storm Bird* herself was lost during a heavy gale on the coast in May, 1870. In this year, also, the schooner *Colonist*, a trader to New Caledonia, found a last resting place on this reef, and the *Thetis* made another visit to it to bring off the crew. Captain J. M. Banks, that most ancient of "ancient mariners", was in charge. It was on his suggestion that a lifeboat fully provisioned was placed in the lagoon of the reef, and where for many years it was ready to succour distressed seamen, but its services were never called into use. It was eventually carried away or lost in some heavy gale.

"The *Alma* was long both a home and a landmark during the time she was a fixture there. Then the brig, *Naiad*, belonging to Nipper and See, got there to stop, although her crew came away in the schooner *Mary Ogilvie*. But the last wreck to bring this reef into prominence was that of the Norwegian ship *Askoy*. This ship, originally the British ship *Argus*, was built in 1878 by Barclay, Curle & Co., at Glasgow, was of iron, and 1,616 tons gross registered tonnage. She was in ballast from a South American port bound to Newcastle to load coal. On December 27, 1911, when between the Middleton Shoal and the reef the current took the ship right on to the rocks at high tide, and as the tide fell she bumped hard on the rocks, and soon had three or four feet of water in the hold. Seeing the impossibility of the ship ever being got off, the crew left her the next day in two boats, the captain and chief officer being in charge. The latter brought his boat to Yamba, at the entrance to the Clarence River, in five days, and its occupants were sent on to Sydney by the next steamer. The captain's boat was picked up by the French mail steamer, *Ville de la Ciotat* four days after the wreck, and those in it were landed at Noumea. Fortunately, no lives were lost. This reef, being now correctly charted and so well known to mariners, there is no reason why it should be such a source of danger in the future, as it has been in the past."

Captain Watson was also the anonymous author of the comprehensive list of Wrecks and Shipping Disasters, published in the *Australian Encyclopaedia* (ii., October, 1926), from which I have abstracted the following list of wrecks on the Middleton and Elizabeth Reefs because there are one or two discrepancies between this list and Captain Watson's earlier article. Beginning on page 684, and continued from pp. 713-731, in Captain Watson's own words, the list is:—

Britannia, ship, Nathaniel Goodspeed master, was wrecked, probably on Middleton or Elizabeth Reefs, in Tasman Sea, 25 August, 1806. Two boats reached Sydney; one boat was lost, and probably 8 lives.

Agnes Napier, schooner, was wrecked on Middleton Reef, Tasman Sea, about 1859. [The H.M.S. "Herald" saw her remains in 1854.—G.P.W.]

(*Alma*, wrecked on an Elizabeth Reef near New Zealand, yet mentioned in Captain Watson's 1916 article, p. 5053, as being on the Elizabeth Reef which concerns us here.—G.P.W.)

Annasona (1,436 tons), barque, formerly *Margaret A. B. Carswell*, was wrecked on Middleton Reef, January, 1907, during voyage from Callao to Newcastle; all the crew (22) were landed at Lord Howe Island, 25 January.

Askoy, ship, was wrecked on Elizabeth Reef, Tasman Sea, 27 December, 1911.

Colonist, for Noumea, was wrecked on Elizabeth Reef, Tasman Sea, 1 January, 1870.

Constitution, American ship, was wrecked on Middleton Reef, Tasman Sea, in 1859.

Defender (1300), ship, of Boston, U.S.A., from Puget Sound to Sydney with timber, was wrecked on Middleton Reef, Tasman Sea, 27 February, 1859. Two boats arrived at Macleay River, and one at Port Macquarie. There was no loss of life.

Douglas (380), barque, of Melbourne, was wrecked on Elizabeth Reef, Tasman Sea, 8 May, 1859.*

*This is an error for 1869, since in the *Sydney Morning Herald* for June 9, 1869, p. 4, reprinted on June 16, pp. 10-11, we read of the total loss of the barque *Douglas* (380 tons). Her captain, Sayers, sailed from Newcastle on May 4 for Yokohama. "He experienced easterly winds from the time of leaving until the morning of the 8th of May, when, in longitude 160 deg. 30 min. E. and latitude 28 deg. 56 min. S., the vessel struck upon a coral reef known as the Golden Grove Shoal, but which was not laid down on any of his charts". An account of their raft-making and the subsequent picking up of the nine of them by the *Storm Bird* follows. "The reef" . . . "is in the shape of a circle, with a circumference of about five miles. All round this reef there was a very heavy surf, but in the centre the water was quite calm. For some time Captain Sayers was completely at a loss to get out of this curious harbour into the open sea". After more than a week they escaped on the raft. "On the following day, namely, the 13th of May, Captain Sayers reports having passed another reef, on which was a large ship of fully 700 tons burthen". Then comes the only natural history note:—The raft "was continually surrounded by sharks, and they appeared to follow them as though waiting for their prey".—G.P.W.

- Elizabeth*, ship, of London, was wrecked on Elizabeth Reef, Tasman Sea, in 1831. The cutter *Fanny* was sent out from Sydney to examine the wreck and reef.
- Errol*, barque, Norwegian, from Peru to Newcastle, was wrecked at midnight on Middleton Reef, Tasman Sea, 18 June, 1909. During the next weeks 17 lives were lost in horrible misery from starvation and thirst. S.S. *Jofua* [*Tofua*] saved 5 survivors, 12 July.
- Maelgwyn* (1,276), barque, on voyage from Peru to Sydney, was abandoned dismasted and sinking off Middleton Reef, Tasman Sea, 26 January, 1907. The crew were landed safely on Lord Howe Island. She was abandoned justifiably.
- Mary Catherine*, ship, was wrecked on Middleton Reef, Tasman Sea, in 1851.
- Mary Lawson*, barque, from Brisbane to China, was wrecked on Middleton Reef, Tasman Sea, June, 1866. The captain, his wife, and all the crew were lost, except three, who sailed in a boat to Clarence River, where one was drowned in the surf.
- Naiad* (297), brig, of Sydney, was wrecked on Elizabeth Reef, Tasman Sea, 9 July, 1885, through a N.W. current.
- Packet*, whaling brig, of Sydney, was wrecked on Elizabeth Reef, 24 February, 1857, at midnight, during a gale, and smashed up next day. The crew sailed away in 2 of her boats, were picked up 4 days later, and landed at Moreton Bay.
- Ramsay*, barque, from Brisbane to London with wool, was wrecked on Middleton Reef, Tasman Sea, about 1852. Eleven lives were lost and survivors in boats suffered hardships before being picked up.
- Rosetta Joseph*, ship, was wrecked on Elizabeth Reef, Tasman Sea, 1 December, 1850, while on voyage from San Francisco. The crew and passengers, 47 all told, left the wreck in 3 boats and arrived safely at Port Macquarie, New South Wales, 10 December.
- Stuart Russell*, was wrecked on Elizabeth Reef, Tasman Sea, about 1856.
- Tyrian* (220), barque, of London, from Honolulu to Auckland and Sydney, left Auckland and was wrecked at night on Elizabeth Reef, Tasman Sea, 25 November, 1851. One boat with people arrived at Newcastle, 2 December. The whaler *Jane*, of Sydney, took away 17 passengers, 30 November, and H.M.S. *Acheron* took the remainder, 9 December. No lives were lost.

The Hon. J. T. Bell wrote in Archibald Meston's "Report on Fraser Island", Queensland, in 1905, as follows:—"Fraser Island is named from Captain Fraser of the ship *Stirling Castle*, wrecked on Elizabeth Reef, 300 miles to the south-east on 21st May, 1836.

"Captain Fraser, Mrs. Fraser, the mate Brown, and some of the crew finally landed on Fraser Island, were received in a friendly manner by the blacks, and passed on in canoes to the mainland at Inskip Point, to be forwarded to the white people at the Brisbane Convict Settlement, which no one reached except Mrs. Fraser, the others, according to her three different and very contradictory stories, being killed by the blacks at or near the present Noosa River".

The most prominent wreck on Middleton Reef was (and still is) that of the *Annasona*, the barque of about 1,400 tons which, on a voyage

from Peru to Australia, crashed on top of the reef early in the morning of January 18, 1907. The master (Captain G. H. Blackstock) threatened to shoot anyone who tried to put over any boat until daylight came and they could review the damage done. His action enabled all his crew and himself to reach Lord Howe Island a few days afterwards, and some of the Islanders still recall his advent. Meanwhile the wreck of his steel ship remained, peopled only by huge rats which thrived for a while upon resting sea-birds. Eventually it was purchased by Mr. Stanley Spain, of Sydney, who sent his schooner the *Young Rock* (Captain Henderson) to obtain salvage from the *Annasona*. The *Young Rock* had earlier been named the *Evangel*.

Eventually an advertisement appeared in the Sydney press:—

“For Sale by Tender, Quantity Gear, salvaged from Barque ANNASONA, including 240 fathoms cable, anchors, steel hawsers, Windlass. Highest or any tender not necessarily accepted. On view at Messrs. Einersen Bros.’ Yard.

“Tenders addressed to undersigned close Noon, 30th inst.

Stanley Spain, 1 Queen’s Court.”

By far the most terrible disaster in the doleful history of Middleton Reef was the wreck of the Norwegian barque *Errol* which was on her way from Chimbote, Peru, to Newcastle, New South Wales, when she struck the reef at midnight, 18th June, 1909. According to contemporary newspaper accounts, she broke into three sections and several of her crew were drowned, whilst others managed to get across to the *Annasona* where they suffered agonies of hunger and thirst. The master was drowned and eaten by sharks, only his legs, still in sea-boots, being recovered. His wife became mentally deranged and died, and there were dark whispers of cannibalism and murder concerning the disappearance of their four children. The *Tofua* eventually took five persons, the sole survivors, off Middleton Reef and brought them, aged and exhausted, to Sydney.

Apart from the wrecked ships and the vessels which came to their rescue, there were a few surveying trips made to the reef. The *Fly*, in the 1840’s, had been instructed to examine “The position and dimensions of the several detached reefs and shoals which lie to the southward of the Great Barrier, and which appear, though with long intervals, to stretch towards Howe’s Island”. However, I find no mention of Middleton or Elizabeth Reefs in J. B. Juke’s *Narrative* of that voyage, published in 1847, though Captain Watson stated that she was there.

The reefs were certainly visited by H.M.S. “Herald” in the 1850’s. This vessel is well known to zoologists through the voyages she made in earlier years (1845-1851), but she continued in active service long afterwards, though no later zoological results were published except in the form of scattered references. Captain H. M. Denham was in command when Middleton Reef was surveyed in 1853. John Denis Macdonald was one of the naturalists aboard her and, though he contributed an excellent general account of the fauna of Lord Howe Island (printed in N.S. Wales Votes and Proceedings of the Legislative Council, ii., 1853, 719th page), he says nothing about the reefs. The *Herald’s* tender was the paddlewheel steamer *Torch*, aboard which was Captain F. Hixson. Abstracts from his log are given in the “Sydney Morning Herald” of March 22nd, 1924. Both the *Herald* and *Torch* made several cruises to Australian Pacific localities,

and in 1854 "They found the wreck of the schooner *Agnes Napier* on Middleton Reef, and also an old wreck on Elizabeth Reef". It would be worth while, if possible, to discover the routes of these vessels and the dates of their voyages, since only in that way will such problems as the type-locality of the Tiger Shark, *Galeocerdo rayneri*, and other species be revealed.

Elizabeth Reef was surveyed by Lieutenant G. E. Richards in the *Renard* in 1878, but there is no available published account of this trip. The charts made by Denham and Richards, with minor alterations, are still in use at the present time. Some years ago, a lifeboat was moored in the lagoon at Elizabeth Reef, with stores for shipwrecked mariners, but either it was stolen or it most probably disappeared in some storm.

In recent years, the reefs have naturally been spurned by shipping, but occasionally a vessel from New Caledonia or Fiji passed close enough to see if there were any persons in distress.

The well-known yachtsman, Ralph Stock, in his *Chequered Cruise*, 1916, published a photograph of Middleton Reef (so far as I know the first picture of the place ever reproduced), and wrote concerning it, as follows:—

"It was worth seeing. Anything more desolate and sinister than this gigantic horseshoe of coral out in the open sea, a menace to every storm-driven ship in a radius of a hundred miles, it would be difficult to imagine. Some day, perhaps, it will be an island, as fair as any in the South Pacific, but at present the . . . coral polyp has not finished its work and Middleton Reef constitutes a death-trap. A white circle of breakers, clear cut against the blue of deep waters outside, and the opalescent green of the lagoon within, and here and there perched on the reef's jagged teeth, like marine scarecrows, wrecks in every stage of dissolution. At the time of the Firm's passing there were five, and never a year goes by without adding to their number."

Again, in his *Cruise of the Dream Ship*, 1921, Ralph Stock reproduces the picture of the *Annasona*, but since he calls it "The Wreck of Tragedy", he had evidently mistaken this ship for the *Errol*.

NARRATIVE OF THE "WANDERER" EXPEDITION.

When travelling from Noumea to Sydney in a 20,000 ton liner some years ago, the present writer passed the vicinity of Middleton Reef, he little thought that he would some day be landing thereon from a yacht in the interests of the Australian Museum. Yet such was to be.

Early in 1936, Mr. Norman K. Wallis, owner of the yacht *Wanderer*, purchased the *Annasona* wreck (for five shillings!) and organized an expedition to visit the Middleton and Elizabeth Reefs, and the writer was deputed by the Trustees of the Museum to accompany the expedition as naturalist.

The schooner yacht *Wanderer* is nearly fifty feet long and fitted with an auxiliary engine. She was named after the *Wanderer* in Masefield's poems, but her name is also the same as that of Ben Boyd's famous yacht,*

*A "poem" was written about Ben Boyd's *Wanderer*, too, by T. Dibdin, and published in Boyd's "Reminiscences of Fifty Years", 1871, pp. 106 to 108, but it is of very poor quality. A painting of Ben Boyd's yacht by O. Brierley was reproduced in The Navy League Journal, February, 1924, p. 5 and fig.

whose moorings she now occupies. On this, the third of her trips to Lord Howe Island, the crew consisted of Messrs. Norman Wallis, H. Newton Scott (navigator), J. Forsyth, and the writer, who had had no previous yachting experience, as naturalist. We sailed from Neutral Bay, Sydney, at noon on Saturday, April 4, 1936, and struck a rough sea and strong south-east wind on leaving the Heads. That very afternoon, an accident occurred which might well have terminated the expedition: the main sheet parted, and Wallis and Scott were washed overboard. Fortunately, they both managed to grab ends of rope trailing in the water, and then a heavy wave swept Forsyth into the sea, leaving a very seasick naturalist for a short while in sole possession of the ship. Then the skipper hauled himself aboard, whilst Scott was aquaplaning below the end of the swinging 30 ft. boom and Forsyth had managed to grasp the counter. Finally, all were got safely aboard, and we hove to for the night. The next few days were marked by rough weather and dolphins and sea-birds were about the only creatures seen. The yacht was blown or drifted well off her course and suffered a good deal of damage, even the bowsprit being carried away one night during a cyclone. A flying fish (*Exocoetus volitans*) was washed up on deck and was the first specimen secured for the Museum. Two days after the storm, a gannet visited us, although we were over one hundred miles from Lord Howe Island, and we saw a large waterspout, which later disappeared. Very early on the morning of April 11th, the ship's course had to be altered to avoid striking two large whales, and later in the day we sighted the mountains of Lord Howe Island, and managed to reach an anchorage there the same night.

Here our little crew was augmented by three of the islanders, Messrs. Frank Payten, Tom Payten and Maurice Wilson, and we left for the main objective: the Elizabeth and Middleton Reefs.

After two days' sailing through a curious criss-cross sea,* we sighted Elizabeth Reef on the afternoon of the 14th, and, as we approached it, huge green waves were seen and heard crashing upon the ring of submerged coral which encircled the smooth lagoon, some five by four sea miles in extent. From the appearance of the surf, it appeared impossible to approach such a reef, but Wallis and a couple of others went off in the dinghy to test the anchorage in an opening marked on the chart, taking with them a compass, some food and drink, lights, etc., in case they became stranded. Those who remained on the yacht were relieved when the dinghy returned, reporting safe anchorage, and at sunset we moved slowly through the opening, and, for the first time in the whole voyage, kept an even keel. The water was alive with sharks and everybody caught at least one. They were whalers (*Galeolamnoides macrurus*), five to six feet long, but immature; their bodies were suspended around the yacht to form most unusual fenders.

*This phenomenon seems characteristic of these waters. In an account of the wreck of the *Rosetta Joseph*, a 265 ton barque from the California goldfields ("Sydney Morning Herald", 13 December, 1850), we read of the survivors making out to sea:—"After running for some time, most favourably, about 11 a.m., encountered a remarkable cross sea, having much the appearance of the junction of two currents".

A sailor acquaintance of mine also observed this criss-cross sea in 1909 and ascribed it to the effect of submarine mountains upon the currents.

On Wednesday, April 15, we were all up early as the reefs were being uncovered by the ebb-tide and we landed upon parts of them. Since there is a permanently exposed sand cay here and the reef was not known to have been annexed, the Expedition took possession of Elizabeth Reef in the name of His Majesty, King Edward VIII.

In the short time available, I collected all I could whilst the tide allowed, and obtained a new species of clam, various shells and crabs, a new mollusc, and some marine worms. By fishing, we obtained several different species, all identical with Lord Howe Island forms, except a Red Bass (*Lutjanus coatesi*) which was the same as a Queensland fish which has the reputation of being poisonous as food. The fishes and sharks here had never known the presence of anglers and took baits eagerly, so that we had enough for both scientific and gastronomic purposes. Our navigator, trolling for sporting fish, caught a Lizard Fish (*Synodus*) which was only slightly larger than the automatic striking lure which it had so gamely taken. We also caught a new species of Trevally. Gannets and Noddies were the only avian inhabitants of the sand cay, where Frank Payten distinguished himself by catching a shark by the tail as it came into shallow water after bluefish.

We rose at dawn the next day and prepared to leave Elizabeth Reef. There was some anxiety when getting the anchors up, as we were very near coral, but we finally got away and plunged into a terrific sea. The trip to Middleton Reef was very rough, the yacht rolling considerably and often shooting breakers. Mutton birds, gannets, and a Fluttering Petrel were the only living things in view.

At about noon, the wreck of the *Annasona* was espied, her bowsprit raised to the squally heavens like some titanic forefinger uplifted in admonition. Here, then, was Middleton Reef, quite invisible from a distance and only indicated by this tragic relic. We approached the reef from the lee shore, and saw numerous small niggerheads on the coral. The surf was not so strong as that at Elizabeth Reef, although the lagoon was of about the same area, and in the afternoon we made our way into Herald Haven, where we anchored. Tom Payten immediately caught a Tiger Shark, and the water around the yacht was soon thick with Whalers, and an occasional Kingfish or Tiger Shark. One or two turtles were also seen.

The next day, April 17th, we all visited the wreck of the *Annasona* crossing the lagoon whose floor consisted of coral sand, with sparse coral patches, until the inner rampart of the reef-crest was reached. This reef-crest, upon the outer rampart of which the *Annasona* lay, was peculiar in having a moat of impounded water whose level was higher than that of the water in the lagoon. There was a rich variety of corals in this moat, also small clams and Turban shells (*Turbo cepoides*), the like of which must have sustained the victims of shipwreck in other days. The *Annasona* yielded much fine timber—teak, mahogany, and lignum vitae—and other relics to our crew, but I was surprised to find no coral growth or animal life whatever attached to her hull, with the exception of three Black Periwinkles (*Melanerita melanotragus*); possibly rust had fouled the water. Fishes in the vicinity of the wreck all belonged to Lord Howe Island species: Bluefish, Double-heads, Parrot fishes, Demoiselles, and others. Some ballast stones, probably brought from Callao, had formed a bank occupied by swiftly running crabs, but the only bird inhabitants were

Noddies (*Anous stolidus*). In the lagoon, beche de mer were common browsing over the bottom. We took possession of the reef in the name of the King, thus having made the first additions (inconspicuous though they be) to the Empire during his reign.

We also visited a smaller wreck, thought to be the remains of the ill-fated *Errol*, but were unable to land and join the few moulting Noddies which perched thereon.

The next day, we paid another visit to the *Annasona*, whence my friends removed the figurehead and some miscellaneous gear. We left some provisions, fishing lines, rockets and other things aboard her, also a plate (a la Dirk Hartog) inscribed with a note of our visit for future visitors or shipwrecked sailors. The wreck itself had small pools along her ribs and keel, and from these I obtained small Bluefish, Scorpion Fish, some sea-slugs and Palolo worms, and other specimens. The outer edge of the reef-crest was encrusted with *Lithothamnion*, which was largely burrowed into by Sea Urchins, as at Lord Howe Island. Indeed, the similarity of the fauna of Middleton and Elizabeth Reefs to that of the southernmost coral reef in the world at Lord Howe Island is very striking and demonstrates that these places are more closely connected with one another than with New Caledonia or the Great Barrier Reef.

Very early in the morning on the 19th a gale sprang up, so that it was difficult to stand on deck, and we dragged our anchors and lookēd, for a while, like being blown on to the reefs. However, the anchors were got aboard, polished by grating along the coral sand, and, forced to postpone all shore activities, we made out to sea. After beating through rough seas all day, we hove to, and, being short of petrol, which was being conserved for emergencies, drifted helplessly in the treacherous currents around Elizabeth Reef. More by good luck than anything else, we missed the reef and proceeded laboriously, through lack of wind this time, in the direction of Lord Howe Island. On the afternoon of the 20th a good wind sprang up and we sped forth through seas still rough, but helped by a southerly drift. The bilge water, always unpopular, now slopped up through bunks and lockers spoiling note-books, cameras, clothes and gear, but finally that evening we reached Lord Howe Island, exhausted and bearded. The hillsides were swarming with anxious islanders, who gave us a wonderful welcome, for we were several days overdue. Here we stayed for about a week, mending sails, refitting, and recuperating, and I secured some more specimens for comparison with those from the reefs we had left behind. The weather was very unsettled on the 29th, but we decided to sail for the mainland, and a convoy of gannets accompanied us for the first part of our homeward journey. Land was sighted on May 2nd and proved to be the North Brother Mountain, northern New South Wales. A Horse Mackerel and a new species of Little Tunny were caught by trolling and, the next day, we witnessed a grand display of sporting and leaping by innumerable dolphins, pairs of which would sometimes leap twelve feet into the air. Slowly and pleasantly we sailed down the coast in calm water at last, after our 25 stormy days out of 29, and a total of 117 hours hove to in rough seas; passing Newcastle, Norah Head, and then Barrenjoey light-house as darkness fell; past the jewelled lights of Manly to enter the Heads at 11 p.m. At eight bells, exactly midnight, the *Wanderer* had returned to Ben Boyd's old moorings at Neutral Bay.

ZOOLOGICAL RESULTS.

BIRDS.

Throughout the trip I kept a constant watch for birds, and the monotony of many a trick at the wheel was not a little broken by this practice. The following notes on birds are taken from my diary, with annotations where necessary. No specimens were collected.

1. *Between Sydney and Lord Howe Island.*

April 4. After the accident, when three men were washed overboard, and I lost a boathook when trying to fish one of them aboard, I noted, "Last impression: handle of a boathook protruding from the water and a mutton bird inspecting same as if to assess its value as a nesting site". Birds are often curious about floating objects and more than one yachtsman, washed overboard, has owed his subsequent rescue to this fact.

April 5. Birds of Providence* quite common, often flying at steep angles, so as to appear about to topple over. The greyish facial feathers are much lighter in colour than in (beach-stranded) Sydney specimens. Fluttering Petrels seen with very white nape and rump and flying rather like swallows at times. One Mollymawk.

April 10. A school of mutton birds, sitting on the water, was disturbed at our approach. Estimated distance from Lord Howe Island is 120 miles, yet a Gannet paid us a visit at 12.30. La Perouse deduced the existence of land in the vicinity of Lord Howe Island from the presence of birds. An English translation of his remarks (Voy. La Perouse, ed. 3, iii., 1807, 139-140) states, under date 17 January, 1788:—

"On the 17th, being in the latitude of 31 deg. 28 min. south, longitude 159 deg. 15 min. east, we were surrounded with an innumerable quantity of gulls (*goëlettes*), [probably mutton birds—G.P.W.] which led us to suspect, that we were passing near some island or rock; and many wagers were laid that we should discover some new land before we reached Botany Bay, though we were not above a hundred and eighty leagues from it. These birds accompanied us till we were within fourscore leagues of New Holland; and it is very probable, that we left behind us some islet or rock, which serves as an asylum for these birds, for they are much less numerous near an inhabited land."

(As a matter of fact, however, the presence of flocks of birds at sea is not always an indication of the proximity of land. I have myself seen birds in numbers hundreds of miles at least from any land when travelling between Norfolk Island and Tonga.)

April 11. Scott sighted Lord Howe Island† (Mount Gower) at 9.55

*The Bird of Providence has been dealt with recently in the Australian Zoologist, viii., May, 1934, 42-49, pl. i.

†The early history of the birds of Lord Howe Island has yet to be written. The Mitchell Library, Sydney, houses priceless old diaries and drawings, some of which deal with birds now extinct there. Hindwood has brought to light Bowes MS. Journal, but there are other MSS. by Ralph Clark, William Bradley, George Raper and others. Some interesting notes by David Blackburn were published in the *Journ. Roy. Austr. Hist. Soc.*, xx., 1934, 327-328. The first published account is in Thomas Gilbert's *Voyage from New South Wales to Canton in 1788* (published 1789). Other old books of importance are those of Phillip, Hunter, Tench, Collins, and Forster's *Neuesten Reisen nach der Botany Bay*.

a.m., and estimated its distance as about 45 miles. It was then obscured by haze and I did not see it until about 11 a.m. Two Gannets visited us this morning, one with much "immature" plumage, and the other with a black mark on one foot. Mutton Birds round about as usual.

2. *Lord Howe Island to the Reefs and Back.*

April 12. We cast off from Lord Howe Island at 5.45 and sailed past the Admiralties into open water, when the engine was started and we steered N. by E. Saw a few Noddies and Gannets but no Bosun Birds, and altogether the bird season seems almost over here. Islanders report fluffy baby mutton birds as being present on Lord Howe Island at present.

April 13. Very few mutton birds to-day. Some Gannets with "immature" plumage.

April 14. A Bosun Bird with red beak and tail-feathers soared aloft. Otherwise only an occasional mutton bird or creature like a black sea swallow. No Birds of Providence.

At 12.20 p.m. ship's (Sydney) time, Forsyth, at the cross-trees, sighted the Elizabeth reef. . . . Fluttering and ordinary petrels were in evidence.

April 15. Some of the men visited a distant coral cay. They reported that it was 10 feet high and that Gannets flew from it as they approached and Noddies fluttered in the vicinity, all these birds utilising the cay as a place for rest. (These are apparently the only records of birds from Elizabeth Reef, and show that there is apparently no resident avian population, but that the exposed parts are merely used for rest by Lord Howe Island birds.)

April 16. Very rough trip towards Middleton Reef, the yacht often shooting breakers and rolling considerably. Saw Mutton Birds, Gannets, and a fluttering Petrel.

April 17. Noddies rested on the supine masts and on parts of the wreck of the *Annasona* on the Middleton Reef and were the only birds. In the afternoon, we visited a wreck identified as that of the *Errol*. Noddies perched all over this wreck and were very tame (see figure in Australian Museum Magazine, vi., 1936, 102). Most of them were moulting their wing feathers, and some had feathers off the breast.

April 18. Re-visited the wreck of the *Annasona* and noticed the Noddies (*Anous stolidus*) perching, some of them looking down at their toes as I have seen them acting at Michaelmas Cay, Queensland (see Australian Museum Magazine, iii., 1928, p. 248, fig.). As their name signifies, they were very tame. Some bones, and much guano and feathers, were found in different parts of the wreck.

A Gannet and a fluttering Petrel were seen seawards.

April 20. Frank Payten saw a Bosun Bird.

April 21. Arrived back at Lord Howe Island. Gannets here often attack the lead sinkers used by the fishermen and make dents in the lead with their beaks. Sometimes they daze themselves by the blow. One Gannet even attacked the *Wanderer's* log.

3. *Lord Howe Island to New South Wales.*

April 29. Leaving Lord Howe Island, a convoy of Gannets accompanied our craft, probably thinking that we were fishermen and that they would get some scraps. A few Noddies around.

April 30. Westward of Lord Howe Island, but out of sight of it. An Albatross seen this morning had a pale horn yellow bill and a good deal

of dark and light plumage above the wings. Tail white with a dark edging. It appeared near the ship for two days and may have been a colour phase of the Mollymawk.

A number of Mutton Birds and fluttering Petrels over a confused sea.

May 1. A white bird (Tern?) and a Mollymawk seen.

May 2. A Tern with black head seen and then a few others. Some occasional Mutton Birds and several Mollymawks. No Birds of Providence, Bosun Birds or Noddies. Northern coastline of New South Wales sighted.

May 3. Pelicans, Gannets, Mutton Birds, fluttering Petrels and Terns seen in Newcastle Bight.

Then Sydney.

FISHES.

Family GALEIDAE.

Genus *GALEOLAMNOIDES* Whitley, 1934.

Galeolamnoides Whitley, Mem. Qld. Mus., x., 4, June 30, 1934, 191. Orthotype, *Carcharias macrurus* Ramsay and Ogilby.

GALEOLAMNOIDES MACRURUS (Ramsay and Ogilby).

(Plate xiii., Fig. 1.)

Carcharias macrurus Ramsay and Ogilby, Proc. Linn. Soc. N.S. Wales (2), ii., 1, 1887, 163 and 1024. Port Jackson, N.S.W. Type in Austr. Mus.

Carcharinus brachyurus Waite, Rec. S. Austr. Mus., ii., 1, 1921, 14, fig. 8. Not *Carcharias brachyurus* Günther, 1870.

Carcharhinus macrurus McCulloch, Proc. Linn. Soc. N.S. Wales, xlvi., 4, 1921, 457, pl. xxxvii., fig. 4.

Id. Waite, Rec. S. Austr. Mus., iii., 1927, 224.

Id. Roughley, Austr. Mus. Mag., iii., 1927, 152 and frontispiece.

Id. Whitley, Austr. Zool., v., 1929, 354.

Id. Copleson, Med. Journ. Austr., April 15, 1933, 450-458, figs. i., ii. and vi.

Id. Young and Mazet, Shark! Shark! 1933, 272.

Galeolamnoides macrurus Whitley, Mem. Qld. Mus., x., 1934, 191 and 198.

Whaler sharks were very common in the lagoons of both Middleton and Elizabeth Reefs. A male from the latter place had the following measurements and characters:—

Head nearly 12 inches to first gill-slit or $14\frac{1}{2}$ to last. Fifth gill-slit smallest; fourth and fifth lie over pectoral base. Snout $4\frac{1}{2}$. Snout to dorsal origin 20. Standard length 45. Upper caudal lobe 15 from middle of caudal peduncle; lower lobe $8\frac{1}{2}$. Depth of body below first dorsal nearly 9. Distance from snout to pectoral origin 15. Ventral origin to pectoral origin 17. Caudal peduncle to dorsal origin 26. Origin of first dorsal fin to vent 14. Snout to vent $31\frac{1}{2}$. Vent to tip of tail $27\frac{1}{2}$. Width of mouth over 6 inches. Eye 1 by $\frac{3}{4}$. Nostril 1. Interorbital (above) $7\frac{1}{4}$. Inter-narial space $3\frac{3}{4}$. Nostril to eye about $2\frac{1}{2}$; to tip of snout 3. 14 + 14 teeth in each jaw; no symphyseal tooth. Tongue broadly rounded. A broad velum maxillare.

Base of first dorsal fin $5\frac{1}{2}$ inches, its height $6\frac{1}{4}$ and last ray 2. Base of second dorsal 2, its height $1\frac{1}{2}$, and last ray $2\frac{1}{4}$. Base of anal $2\frac{1}{4}$, height 3, and last ray 2. Base of ventral fin 3, its height $3\frac{1}{2}$, and last ray 2. First dorsal origin nearer pectoral than ventral origin. Interdorsal space 14. Origin of second dorsal very slightly in advance of that of anal, though

latter fin is larger. Length of pectoral fin $12\frac{1}{2}$, its base 3 and posterior lobe $3\frac{1}{2}$.

Rows of prominent mucus pores on head. Nasal flaps broad and not lobed. Eye with a well developed nictitating membrane. Labial folds small. Lateral line obsolete. No spiracles. A pit above and below the caudal peduncle, which is transversely oval, there being no caudal keel. Caudal fin notched. A low keel along middle of back between the dorsal fins.

General colour, light ashy grey above, and pale yellowish white below. No black tips to fins. Pupil of eye dark green surrounded by a black line. Iris bronze, surrounded by a grey ring. Remainder of eye whitish.

Some teeth and portion of integument preserved from the above specimen, which was 59 inches in total length.

Austr. Mus., Regd. No. IA 6856.

Elizabeth Reef, 14 April, 1936.

Several other specimens were caught very easily by being hooked and pulled aboard, being despatched by bullets. Males and females, all immature, were represented, and nothing identifiable was found in their stomachs.

At Middleton Reef, on 17th April, larger examples (6 feet or so long), were caught on kingfish bait; these were darker grey than the Elizabeth Reef ones. One of the largest examples was so dark as to appear almost blackish in the water, with fins dusky, particularly towards the edges. The Whaler shark apparently becomes darker with age, and old specimens are known as Black Whalers or Shovelnose Sharks to the fishermen in New South Wales, who say that this shark is the only one that "bleeds through the skin" when caught. Large blood vessels certainly occur just below the skin and drops of blood are said to percolate through the integument of captured specimens; this did not, however, occur in the case of my reef examples.*

This species is known to attack man in Australia, and is evidently just as dangerous on the reefs, as in the newspaper accounts of the "Errol" shipwreck on Middleton Reef it is recorded that the captain was eaten by sharks, and only his legs and boots were recovered.

When working in the lagoons we kept a good lookout for sharks, therefore, but they did not invade the impounded water on the reef crest at Middleton Reef, where most of my collecting was done.

The species is also common at Ball's Pyramid and at Lord Howe Island, where necklaces are made from the vertebrae. Sometimes specimens are found with numbers of vertebrae coalesced.

The type of *macrurus* in the Australian Museum is an old stuffed specimen, but the species was redescribed from fresh material by McCulloch in 1921. A comparison of my measurements and proportions with his shows close agreement, the only noteworthy discrepancies being that in my Elizabeth Reef example the width of the mouth (at least 6 inches) rather exceeds the length of the snout before it ($4\frac{3}{4}$) and the nostrils are about midway between tip of snout and mouth, but there may be some variation in the elongation of the snout with age. The mouth is wider than long. The first dorsal fin rises nearer the snout than the tail. The caudal fin is shorter than the distance between the posterior angles of the bases of the two dorsals.

*Compare the paper on the Subcutaneous Venous System of *Scyliorhinus* by Marples, *Proc. Zool. Soc.*, London, 1936, 317, pl. i. and figs. 1-7. Also Daniel, *Elasm. Fishes*, ed. 3, 1934, 202, figs.

Subfamily GALEOCERDINAE.

Genus GALEOCERDO Müller and Henle, 1837.

GALEOCERDO RAYNERI Macdonald and Barron.

Galeocerdo rayneri Macdonald and Barron, Proc. Zool. Soc., London, September 15, 1868, 369, pl. xxxii. Australian coasts (type) and Lord Howe Island.

A small male, about 44 inches to the upper caudal pit, was hooked on kingfish bait at Middleton Reef on the night of April 16. It had about thirty-four dark spots along the sides, and some more along the tail; they were in about three longitudinal rows anteriorly. First dorsal fin pale grey; almost whitish in life. It vomited all its food before being hauled aboard.

Some teeth preserved as Austr. Mus. Regd. No. IA 6860.

A larger specimen had the body more conspicuously banded, but the species was not as common as the whaler at Middleton Reef.

Family EXOCOETIDAE.

My friend Anton Brunn has recently issued a comprehensive report on the Flying-fishes (*Exocoetidae*) of the Atlantic (Dana Report, No. 6, 1935) which is easily the most thorough and up-to-date account of the group and has been utilised in identifying the Tasman Sea species which were washed aboard the "Wanderer" in heavy weather between Sydney and Lord Howe Island.

Flying fishes are common in the open ocean off the warmer parts of Australia, but the species have not all been captured and classified. Often I have watched them from various ships between Australia and Lord Howe Island, the Solomons, Fiji, New Caledonia, the New Hebrides, Cook Islands and elsewhere, and noticed from the "wing" coloration that there were more species to be seen than were currently listed. The first fish recorded from anywhere near the eastern coast of Australia was a flying-fish with black body and red wings noted by Bougainville (Hist. Acc. Voy., iv., 1773, 307-308) in the open sea eastward of the Great Barrier Reef, and, earlier still, Dampier figured "a flying fish taken: in ye open sea", which is recognisable as an *Exocoetus*.

Genus EXOCOETUS Linné, 1758.

Exocoetus Linné, Syst. Nat., ed. 10, 1758, 316; ed. 12, 1766, 520. *Ex. Artedi*, 1738. Haplotype, *E. volitans* Linné.

EXOCOETUS VOLITANS VAGABUNDUS, *subsp. nov.*

Exocoetus volitans Linné, Syst. Nat., ed. 10, 1758, 316. Europe and America. *Id.* White, Voy. N.S.W., 1790, 295, and plate, fig. 2 (N.S.W.). *Id.* Richardson, Rept., 12th meet. Brit. Assn. Adv. Sci., 1842 (1843), 25. *Id.* Griffith, Anim. Kingd. (Cuvier), x., 1834, 396 and footnote. *Id.* Fowler, Proc. Acad. Nat. Sci. Philad., 1907 (1908), 424 (Victoria). *Id.* McCulloch and Whitley, Mem. Qld. Mus., viii., 1925, 139 (Queensland). *Id.* McCulloch, Austr. Mus. Mem., v., 1929, 104.

Exocoetus evolans, Cuvier and Valenciennes, Hist. Nat. Poiss., xix., 1846, ed. 2, 101 (New Holland). *Id.* Günther, Cat. Fish. Brit. Mus., vi., 1866, 282 (N. Australia). *Id.* Steindachner, Sitzb. Akad. Wiss. Wien., liii., 1866, 470 (Port Jackson). *Id.* Waite, Austr. Mus. Mem., iv., 1899, 57 (N.S.W.). *Id.* Zietz, Trans. Roy. Soc. S. Austr., xxxiii., 1909, 263 (S.

Austr.). *Id.* McCulloch, Austr. Zool., ii, 2, 1921, 30, pl. x., fig. 106; Austr. Zool. Handb., i, 1922, 30.

Exocoetus volans Saville-Kent, Great Barrier Reef, 1893, 299 and 370 (Queensland).

D. 13; A. 13; P. 2 + 14; V. 1 + 5; C. 15.

Sc. 42, L. tr. $6\frac{1}{2}$ (Dorsal origin to L. lat.). L. lat. 36, ceasing by caudal peduncle. There appear to be 17 or 18 predorsal scales, but some are missing.

Following Bruun's methods of investigation, the specimen of two-winged flying-fish may be described as follows:—

Head, 25 mm. Snout, 5. Diameter of eye, 7. Interorbital, 9. Length of pectoral, 67. Ventral, 12. Upper lobe of tail, 18.5. Lower lobe of tail, 26.5. Predorsal length, 62. Breadth of body, 14. Depth, 17. Height of dorsal, 10. Preventral length, 40.5. Preanal length, 63. Standard length, 94. Total length, 119 mm.

Bruun has discarded the more commonly used method of expressing the measurements in fractions of either head or standard length, but reduces his measurements to percentages of the standard length. The above measurements thus reduced are as follows:—

Head, 26.6%. Snout, 5.3%. Eye, 7.4%. Interorbital, 9.5%. Pectoral, 71.2%. Ventral, 12.7%. Upper lobe of tail, 19.6%. Lower lobe of tail, 28.2%. Predorsal length, 66%. Breadth of body, 14.9%. Depth, 18%. Height of dorsal, 10.6%. Preventral length, 43%. Preanal length, 67%.

The present specimen works down to *Exocoetus volitans* in Bruun's key to adults of Atlantic species. He found that juvenile characters disappeared before a length of 100 mm. is achieved, and my specimen just enters this category. On comparing it with his tables, the following differences are revealed:—

Diameter of eye, 7.4, instead of 6.2 to 6.7% of standard length.

Interorbital, 9.5, instead of 7.9 to 8.6% of standard length.

Pectoral, 71.2, instead of 73.2 to 77.1% of standard length.

Ventral, 12.7, instead of 13.3 to 14.5% of standard length.

Otherwise my specimen comes within the limits of variation of his Table 9. However, my Tasman Sea specimen differs more in cephalic characters, especially as regards the interorbital, which is 9.5% of the standard length, a value much higher than any of Bruun's and apparently not due to immaturity. In the position of the fins my specimen shows no marked abnormality, but the pectoral and ventral percentages show notably lower values, only approached by some figures in Bruun's Table 13, also the fin-counts approach those of Table 16 rather than the earlier ones.

Mouth toothless.

Colour, in spirit, brownish to greyish above, brilliant silvery, with a slight bluish tinge on sides and white tinged with yellowish below. Anal and ventral fins practically hyaline. Dorsal with a few smoky marks. Caudal infuscated. Pectorals uniform, greyish for the most part, but with a margin of white and the lowermost rays also white.

Described from a specimen 94 mm. in standard length or nearly $4\frac{3}{4}$ inches overall.

Locality: Tasman Sea, about half-way between Sydney and Lord Howe Island. Washed aboard the yacht "Wanderer" at night, 8th April, 1936. Coll. G. P. Whitley, Austr. Mus., Regd. No. IA 6854.

In view of the differences observed between this specimen and the Atlantic *Exocoetus volitans*, and considering their wide geographical separation, I provide a new subspecific name *vagabundus* for the Australian form in reference to its distribution and after the yacht "Wanderer".

The Australian Museum has a few specimens of the two-winged *Exocoetus*, but it appears as if the four-winged flying fishes are commoner in Australian seas, as they are better represented in the collections. In the Atlantic, on the other hand, by far the largest quantity of adult flying-fishes examined by Bruun belonged to *Exocoetus volitans*.

Two specimens labelled "Australian Seas" probably came from the Tasman Sea.

The specimens labelled "South Pacific Ocean" came aboard a ship at 8.30 p.m. one evening in August, 1930, and were secured by Mr. Melbourne Ward when east of the Friendly Islands and south of Niue in 22 deg. 08 min. S. lat. and 169 deg. 02 min. W. long. Previous records from Oceania have been given by Fowler (Mem. Bishop Mus., x., 1928, 80, fig. 16; xi., 1931, 319 and xi., 1934, 393), most of whose specimens were from the Hawaiian Islands.

No unlocalised specimens have been utilised, although there are some interesting flying fishes, unfortunately without data, in the Australian Museum. One of these has two long barbels, D. 12, A. 10, and pectoral fins not reaching base of caudal; it is 6 inches long and is apparently the young of a four-winged species.

Fowler includes in the synonymy of *Exocoetus volitans* a fish named *Exocæetus longibarba* by De Vis (Proc. Linn. Soc. N.S. Wales, viii., 1884, 454) from New Britain, notwithstanding the fact that the young phase of *volitans*, as figured by Fowler, has no barbels. I have seen no specimen corresponding to De Vis' description.

Genus HIRUNDICHTHYS Breder, 1928.

HIRUNDICHTHYS SPECULIGER PRÆCOX, *subsp. nov.*

? *Exocoetus speculiger* Cuvier and Valenciennes, Hist. Nat. Poiss., xix., "1846" = May, 1847, 94; ed. 2, 69. Mers des Indes (type), Pacific locs., Mauritius, and King George's Sound, W. Australia. *Id.* Günther, Cat. Fish. Brit. Mus., vi., 1866, 287 (Australia, etc.).

Cypsilurus speculiger Jordan and Seale, Bull. U.S. Bur. Fish, xxv., 1905 (1906), 209, fig. 13. Between Auckland and Sydney. *Id.* McCulloch, Austr. Zoologist, ii., 2, 1921, 30 (N.S.W.).

Exonantes speculiger Waite, Rec. Canterb. Mus., i., 1907, 15 (New Zealand). *Id.* McCulloch, Zool. Res. Endeavour, i., 1, 1911, 30 (between Port Stephens and Newcastle, N.S.W.). *Id.* McCulloch, Austr. Mus. Mem., v., 1929, 106.

On the morning of April 10, a four-winged flying-fish was found on the "Wanderer's" deck; it was somewhat sun-dried, so that the following measurements may be regarded as approximate. The fins were dusky, the pectorals having ill-defined oval white spots. It belongs to the species listed as *Cypselurus speculiger* from New South Wales, and well figured by Jordan and Seale from a specimen about 11 inches in total length.

All the Australian Museum specimens are juvenile, the largest being only a little over 3½ inches in length.

These specimens do not agree with Cuvier and Valenciennes' original description of *speculiger* in their proportions and the coloration of the

paired fins is also different. It was only with considerable doubt that those authors identified a Western Australian specimen as their species and Günther, in his Catalogue, followed by recording another Australian specimen as *Exocoetus speculiger*? Later authors, such as Bleeker, Jordan and Seale, and others, have regarded any four-winged flying-fish with mirrored pectorals and having the dorsal and anal origins opposite one another as *speculiger*. Since, however, my Tasman Sea specimens are not typical *speculiger*, I provide the new subspecific name *praecox* for the eastern Australian form, the holotype being registered No. IA 4050 in the Australian Museum, from Port Jackson, New South Wales.

Family SYNODONTIDÆ.

Genus SYNODUS Scopoli, 1777.

Synodus Scopoli, Introd. Hist. Nat., 1777, 449. Haplotype, *Esox synodus* Linné. *Id.* Norman, Proc. Zool. Soc. Lond., 1925, 102 (refs. and synon.).

The generic name *Synodus* is at present employed for a number of species which would be better separated into subgenera to facilitate classification. In his recent invaluable revision of these lizard-fishes, Norman was not certain as to the identity of the genotype, *Esox synodus* Linné, an American species, but I see no reason for doubting the correctness of his determinations. Another Linnean species, *Salmo saurus*, is evidently the type of an allied genus to be known as *Tirus* Rafinesque, with *Saurus* Cuvier, *Alpismaris* Risso, and *Laurida* Swainson as its synonyms. No other generic names call for consideration here, so that the way is clear for new nominations.

The following new names are therefore proposed, the key-characters given by Norman being sufficiently diagnostic for their definition.

Negotirus, nov. Orthotype *Synodus evermanni* Jordan and Bollman, and including *S. intermedius* (Spix), and *S. poeyi* Jordan.

Newtonscottia, subg. nov. of *Synodus*. Named in honour of Mr. H. Newton Scott, navigator of the "Wanderer". Orthotype, *Synodus houlti* McCulloch, and including *S. variegatus* (Lacépède) with its synonyms and *S. lacertinus* Gilbert. This leaves *S. synodus* and *S. meleagrides* in the typical subgenus *Synodus*.

Austrotirus, nov. Orthotype, *S. similis* McCulloch. Also includes *S. kaianus* (Günther), and *S. indicus* (Day).

The species called *Salmo saurus* Linné stands alone as the representative of the genus *Tirus* of Rafinesque.

Allouarnia nov. Orthotype, *Synodus sageneus* Waite, a well-known Western Australian form = *Allouarnia sagenea*. Named after Francois de St. Allouarn, an early explorer, who claimed Western Australia for France in 1772.

Exotirichthys nov. Orthotype, *Synodus altipinnis* (Günther), as described and figured by Norman. Tentatively includes *S. foetens* (Linné) and *S. scituliceps* Jordan and Gilbert.

Esosynodus, nov. Orthotype, *Saurus lucioceps* Ayres.

SYNODUS (NEWTONSCOTTIA) HOULTI McCulloch.

Synodus japonicus McCulloch, Mem. Qld. Mus., vii., November 4, 1921, 165 (Murray Island and Lord Howe Island). Not *Cobitis japonica* Houttuyn, 1782, from Nagasaki. *Id.* McCulloch, Austr. Mus. Mem., v., 1929, 78.

Synodus houlti McCulloch, Mem. Qld. Mus., vii., November 4, 1921, 165, pl. viii., fig. 1. Near the Capricorn Group, Queensland. Holotype in Queensland Museum. *Id.* McCulloch, Austr. Mus. Mem., v., 1929, 79. D. 12; A. 9; P. 14; V. 8; C. 17. L. lat., 61. L. tr., $5\frac{1}{8}$.

Head (45 mm.), 3.4; depth (23), 6.7 in standard length (155). Eye (6), 7.5. Snout (10), 4.5. Interocular (6), 7.5. Interorbital (4), 11.2. Pectoral (16), 2.8 in head. Upper surface of head rugose above and behind eyes. Snout broader than long. Upper lip projecting very slightly beyond lower, not ending in a fleshy knob. Two or three rows of palatine teeth anteriorly. Mouth extending well beyond eye. Postoral portion of cheek naked.

$5\frac{1}{2}$ scale-rows between lateral line and middle of dorsal fin. 19 scales between occiput and origin of dorsal fin, which is nearer the adipose fin than the snout. Longest ray of dorsal less than half length of head and, when laid back, not reaching the tips of succeeding rays. Base of anal fin shorter than that of dorsal. Origin of anal fin about four times as distant from head as from base of caudal. Pectorals short and rounded, extending slightly beyond vertical of ventral origin. Ventrals about as long as postocular portion of head. Caudal peduncle depressed.

Colour in spirits brownish above and whitish below. A series of dark grey blotches along the median line of the back, double just before the dorsal fin. A similar series along the upper part of the sides. About eight large indistinct greyish blotches along lateral line. Numerous smoky marks and lighter marbling on head. Most of the scales with tan borders. Fins plain brownish-yellow. Eye pinkish and silvery.

No dark mark above gill-opening.

Described from a specimen 155 mm. in standard length or about $6\frac{1}{2}$ inches over all.

Locality: Elizabeth Reef, April 15, 1936. Caught on a spinner by Mr. H. Newton Scott, a surprising capture, since the spinner was almost as large as the fish itself, which must be very voracious as the strong teeth and expansive mouth suggest. Mr. Scott's navigation meant everything to the expedition, and he also kindly assisted me to get specimens from the reefs. I have much pleasure in naming the new subgenus in his honour.

This fish enters Norman's section relating to *Synodus variegatus* (Lacépède). However, it disagrees in several respects from his description—in the insertion of dorsal and anal fins in relation to other parts, length of ventral fins, and in colour—and it is probable that more than one species is included in Norman's synonymy of *S. variegatus*.

A queried synonym of Norman's is *Synodus houlti* McCulloch (Mem. Qld. Mus., vii., 1921, 165, pl. viii., fig. 1) from the Capricorn Group, Queensland, but this appears to be a good species, agreeing better with my Elizabeth Reef specimen than Lacépède's *variegatus*.

McCulloch's type is not in the Australian Museum, but Lord Howe Island specimens labelled *Synodus variegatus* agree with the Elizabeth Reef example and Australian and Lord Howe Island records of "*Synodus japonicus*" may be referred to *houlti*. The coloration and relative proportions of the head appear to be rather variable.

Family MURAENIDAE.

Genus GYMNOTHORAX Bloch, 1795.

GYMNOTHORAX FLAVIMARGINATUS ANNASONA, *subsp. nov.*

Muraena flavimarginata Rüppell, Atlas zu Rüppell, Reise (Senckenb. Nat. Ges.), Fische, 1831, 119, pl. xxx., fig. 3. Red Sea.

Muraena flavomarginata Günther, Cat. Fish. Brit. Mus., viii., 1870, 119 (Norfolk Island specimen).

Gymnothorax flavimarginatus Waite, Rec. Austr. Mus., v., 3, March 11, 1904, 145 (Lord Howe Island), and Trans. Roy. Soc. S. Austr., xl., 1916, 453.

A small moray or reef eel was obtained on Middleton Reef. It was rather damaged, but the following characters can be made out.

Head ($2\frac{1}{2}$ inches), 7.6; distance from snout to vent (9), 2.1; tail (10), 1.9 in total length (19). Eye, 5 mm. Snout, 14. Interorbital, 8. Upper jaw, 30. Depth of body about 25. Head about one-third of trunk and mouth-opening about half of head. Head long, with rather a long snout and having a few small mucus pores.

Anterior nostrils tubular, posterior ones without tube. Eye over middle of mouth-opening. Lips entire. A single series of teeth, rather like those of a shark, but with entire edges, in each jaw, less than 20 on each side of mandibles; no inner series of teeth. At least two long, trenchant, depressible fangs on the vomer. Mesial teeth on intermaxillary fang-like.

Form of body elongate, somewhat compressed.

Dorsal fin high, originating in advance of the level of the gill-openings; anal lower and arising just behind the vent; the two join the caudal which is truncated in this specimen, perhaps due to injury.

When alive I noted the colours as "brown and white. White edges to fins. Pupil dark blue. Iris coppery orange", but since death and preservation in alcohol the coloration has altered slightly, thus:—Ground colour creamy yellowish to brownish, densely overlain by small irregular dark brown blotches which are nearly all smaller than the eye. Anal, caudal and posterior margin of dorsal edged with cream. Eye blue. No dark mark at gill-slit or at corner of mouth. No crossbands.

Described (and figured) from the holotype of the subspecies, a specimen 19 inches long. Austr. Mus., Regd. No. IA 6867.

Locality: Middleton Reef. Speared by Mr. Tom Payten near the wreck of the "Annona", April 18, 1936. Other specimens of this species are preserved in the Australian Museum collection from Lord Howe Island, labelled as *Gymnothorax flavimarginatus* (Rüppell).

The original figure of *Muraena flavimarginata* Rüppell, shows an eel with uniform dusky head, gill-opening in a small black patch, smaller mottlings on the body and yellow margins to fins. Weber and Beaufort (Fish. Indo-Austr. Archip., iii., 1916, 374) give an array of synonyms of *flavimarginata*, which they describe as having the head more than 3-3.5 in trunk, and Bleeker's figure in the "Atlas Ichthyologique" illustrates this feature.

Gymnothorax flavimarginatus has been recorded from Darnley Island, Queensland, by Richardson (Zool. Erebus and Terror, Fish, 1848, 84) as *Muraena prattbernon* Quoy and Gaimard, and is included in McCulloch's Check-list as *Gymnothorax javanicus* Bleeker, a species which Jordan and Seale, writing of Samoan specimens, regarded as distinct from *flavimarginatus*. In view of the differences in colour and proportions, I consider that the Phillipian form of this species (*i.e.*, specimens from Middleton Reef, Lord Howe Island, and Norfolk Island) would be better distinguished by a subspecific name and I propose *annona* for them with Middleton Reef as type-locality.

An unidentifiable eel was obtained from the stomach of a Red Bass.

Family EPINEPHELIDAE.

Genus EPINEPHELUS Bloch, 1793.

EPINEPHELUS FORSYTHI, *sp. nov.*

(Plate xiii., fig. 4.)

The Black Rock Cod was a common fish at both Elizabeth and Middleton Reef. It is a savage species and several of us were rushed by them as we waded on Middleton Reef, and we had to beat them off. Larger specimens were hooked from the yacht and were welcome as food. This species is recorded from Australia in literature as *Epinephelus fuscoguttatus* (Forsk.) but this name is not acceptable as the Phillipian specimens are atypical.

Forsk.'s original description under *Perca summana* var. *fusco-guttata* (Desc. Anim., 1775, pp. xi. and 42) mentions "Corpus caeruleum. Dentes multi, setacei. Macula nigra in dorso caudae. Guttae circulares fusc ferrugineae. Caput, maxillae and M.Br. pariter guttatae. Oculi remotiusculi. Vertex inter oculos planus, subcavus. Squamae parvae, vix dentatae. Cauda altior. Rad. P. 18. C. 18 . . ." Whilst the colouring of species of *Epinephelus* is variable within limits, the colours given by Forskal cannot apply to the Phillipian species, and neither can some of his other characters. As there is no synonym from the Australasian region, I propose *Epinephelus forsythi*, *sp. nov.*; named in honour of Mr. J. Forsyth, a member of the expedition. Since specimens were not preserved from the reefs, being too large, the type locality is designated Lord Howe Island, and Austr. Mus., Regd. No. I 1793, may be taken as the holotype.

Notes on a specimen from Elizabeth Reef:—

D. xi/14 (15); A. iii/8 (9). L. lat., circa 96, the tubules small, apparently not branched. Head ($10\frac{3}{4}$ inches), 2.5; depth of body (8) 3.4 in standard length ($27\frac{1}{4}$). Eye ($1\frac{3}{8}$), 7.8 in head. Total length, $30\frac{1}{2}$ inches.

Preoperculum with obsolescent serrae. Three opercular spines, the lowermost entirely covered by integument and its tip situated behind the tips of the others. Caniniform teeth on all mouth-bones.

Pectorals, soft dorsal and anal fins, and caudal rounded. Colour very dark brownish grey with black blotches on posterior parts of median fins and an obscure ephippium on caudal peduncle. No cross-bands.

The stomach contained one much digested fish. No gonads apparent.

Middleton Reef specimen:—

D. i. + xi/14 (15); A. iii/9; P. i/18.

Head (10), 2.6; depth (9), 2.7 in standard length (26).

Total length, 29 inches.

Preoperculum rough. Lowermost opercular spine hidden by integument, its tip midway between the levels of the tips of the others.

Dorsal spines increasing in length backwards. All fins rounded.

Body lighter brown than Elizabeth Reef example and marbled with greyish. The margins of the ventrals and the unpaired fins are kid white. Sides of head, body, and parts of fins with blackish spots. A dark ephippium over caudal peduncle.

The accompanying figure shows a living specimen photographed at Lord Howe Island by the late Allan R. McCulloch.

Family ARRIPIDIDAE.

Genus ARRIPIS Jenyns, 1840.

ARRIPIS TRUTTA (Bloch & Schneider).

Sciaena trutta Bloch & Schneider, Syst. Ichth., 1801, 542. Ex Forster MS.
Queen Charlotte Sound, New Zealand.

Arripis trutta McCulloch, Austr. Mus. Mem., v., 1929, 200 (synon.).

The "Salmon" or Kahawai was seen, but not collected, at Elizabeth and Middleton Reefs.

Family CARANGIDAE.

Genus USACARANX Whitley, 1931.

Usacaranx Whitley, Austr. Zool., vi., 4, February 13, 1931, 316. Orthotype,
Caranx nobilis Macleay, Proc. Linn. Soc. N.S. Wales, v., 4, May 20, 1881,
532, from Port Jackson, N.S. Wales.

The following new species is named *insulanorum* in honour of the three Lord Howe Islanders who joined the "Wanderer" Expedition and performed yeoman services on the reefs; Messrs. Tom Payten, Frank Payten, and Maurice Wilson, all of whom helped me to collect specimens.

USACARANX INSULANORUM, *sp. nov.*

(Plate xiii., fig. 2.)

D. viii/26; A. ii/23; P. i/20.

Length of head a little more than length of body and nearly one-quarter of the total length (27½ inches). Eye (25 mm.) 7.4 in head (185). Snout (80), subequal to postorbital portion of head (80), and longer than maxillary (71). Pectoral fin (168), shorter than head. The curved portion of the lateral line (200) is equal to the straight portion in length.

Snout somewhat produced, rather overhanging. Maxillary not reaching to below eye. A single row of short, peg-like teeth in both jaws, though partly hidden by the coriaceous lips. No villiform teeth. No teeth whatever on vomer or palatines. A broad series of spaced conic or molariform pharyngeal teeth. Fourteen plus twenty-five long gill-rakers on first branchial arch.

Thorax entirely scaly except for a small median patch where scales appear to be obsolete. About 24 scutes, mostly on the posterior half of the straight portion of the lateral line, the largest occupying only about one-third of the depth of the caudal peduncle.

Colour grey above and silvery with iridescence. White below. Pupil of eye black. Fins all dirty yellowish.

Described and figured from a female specimen having minute yellow ova and numerous pyloric caeca.

Locality: Elizabeth Reef, 15th April, 1936.

This species belongs to the *Caranx georgianus* group, embraced by my genus *Usacaranx*, but differs from its congeners in the form of the snout, the small number of dorsal rays, etc.

Family SERIOLIDAE.

Genus REGIFICOLA Whitley, 1931.

Regificola Whitley, Austr. Zool., vi., 1931, 316. Orthotype, *Seriola grandis*
Castelnau.

REGIFICOLA GRANDIS (Castelnau).

Seriola grandis Castelnau, Proc. Zool. Acclim. Soc. Victoria, i., July 15, 1872, 115. Melbourne Markets. *Id.* McCulloch, Biol. Res. Endeavour, iii., 3, 1915, 121, pl. xxxv., fig. 1 (refs. and synon.).

Kingfish were very common at Elizabeth and Middleton Reefs and were often hooked from the yacht. A specimen nearly two feet over all had D.vi/34; A.i/21; head 5; depth $4\frac{1}{2}$; fins yellowish.

Family LUTJANIDAE.

Genus LUTJANUS Bloch, 1790.

LUTJANUS COATESI Whitley.

Lutjanus coatesi Whitley, Mem. Qld. Mus., x., 4, June 30, 1934, 176, pl. xxvi., fig. 2 and text fig. Off Townsville, Queensland. Holotype (No. I.4977) in Queensland Museum.

At Elizabeth Reef, April 15, 1936, Mr. T. Payten caught a couple of specimens of this species. I had on board a copy of the original description and was able to make some comparative notes, since the species was hitherto known only from the holotype.

Specimen A.—Total length, $20\frac{1}{2}$ inches. Head, 158 mm. Depth of body, 166. Length to hypural joint, 446. Eye, 27. Snout, 55. Maxillary, 72. Pre-orbital, 35. Interorbital, 48. Pectoral, 115. Depth of caudal peduncle, 54. Longest (fourth) dorsal spine measures 50 mm., the fifth and sixth spines are little shorter. Gill-rakers 8 + 16 on first branchial arch. The first (upper) seven are stumpy and rugose, the main ones (eighth to eighteenth) slender and strongly denticulate until towards the last ones which again become stunted and rugose. The longest (ninth) gill-raker is at the angle and measures 16 mm. Behind this anterior series is a row of small, very rugose gill-rakers, corresponding to the front ones.

Preoperculum finely serrated. Interopercular frill not developed. Eight rows of scales on preoperculum and five or six on operculum. Seventeen predorsal scales. Suprascapula bluntly serrate. Pectoral fins reaching to beyond the vertical of the vent but not quite to level of anal fin.

In life, the eye was golden peach-colour, and the dorsal fins dark burgundy. No wavy lines on head. The dark portions of the body-scales tend to form stripes along the sides as in my figure.

The stomach contained small lumps of digested animal remains which may have been fish or perhaps cephalopod. Five pyloric caeca. Testes about $2\frac{1}{4}$ inches in length, banana-shaped.

Austr. Mus., Regd. No. IA.6857.

Specimen B.—Nearly 31 inches over all. It has the preopercular denticulations obsolete, the interopercular frill present, and about fifteen predorsal scales. It was yellower about the face than Specimen A, and had a dark red spinous dorsal fin. It was another male with gonads of irregular leaf-shape, $4\frac{1}{2}$ inches long. The stomach contained an organic mass resembling a sea-slug (*Dolabella*) and pieces of crab, also a partly digested snake-eel, over 14 inches long.

In view of the fact that this species is reputed to be poisonous in Queensland, we did not eat any of these fish. It was interesting to find it occurring on Elizabeth Reef, as it is quite unknown to the fishermen of Lord Howe Island.

Family GIRELLIDAE.

Genus IREDALELLA Whitley, 1931.

Iredalella Whitley, Austr. Zool., vi., 1921, 320. Orthotype, *Girella cyanea* Macleay.

IREDALELLA CYANEA (Macleay).

(Plate xiv., fig. 2.)

Girella cyanea Macleay, Proc. Linn. Soc. N.S. Wales, v., 3, February, 1881, 409. No locality (probably coast near Sydney).

This is the Bluefish or Panfish of the Lord Howe Islanders. It was very common at Elizabeth and Middleton Reefs and a few small specimens (IA.6861-3) were even obtained by Mr. Forsyth by firing rifle shots into the pools in the hull of the "Annasona" wreck.

Weed-eaters, with peritoneum black. This species is still fairly common at Lord Howe Island, and Ball's Pyramid, though not so plentiful as formerly, obviously owing to overfishing; even during my brief stay at Lord Howe Island on this occasion, several two-foot long females with ripe ovaries were killed at Ball's Pyramid. The Bluefish used to be caught in New South Wales and Bluefish Point, Manly, is named from them, but it is rarely, if ever, caught near Sydney now.

Family LABRIDAE.

Genus THALASSOMA Swainson, 1839.

THALASSOMA LUNARE (Linné).

Labrus lunaris Linné, Syst. Nat., ed. 10, 1758, 283; ed. 12, 1766, 474. In Indiis.
Thalassoma lunare Fowler & Bean, Bull. U.S. Nat. Mus., 100, vii., April 17, 1928, 321 (refs. and synon.).

Specimens identified as this species were seen swimming near the wreck of the "Annasona" at Middleton Reef on 17th April, 1936. This fish is common at Lord Howe Island.

THALASSOMA QUADRICOLOR (Lesson).

(Plate xiv., fig. 1.)

?? *Labrus trilobatus* Lacépède, Hist. Nat. Poiss., iii., 1802, 454 and 526. Le Grand Ocean équatoriale.

? *Scarus purpureus* Bonnaterre, Tabl. Encycl. Meth., Ichth., 1788, 94. Based on "*Scarus purpureus*" Forskal, Descr. Anim., 1775, x. and 27, from Djedda, Red Sea. Not the *Julis purpurea* of Rüppell or Gunther = *Julis ruppellii* Klunzinger, Verh. Zool. Bot. Ges. Wien., xxi., 1871, 536.

Labrus purpureus Gmelin, Syst. Nat. (Linné), ed. 13, 1789, 1284. *Ex* Forskal.
Grammistes purpureus Bloch & Schneider, Syst. Ichth., 1801, 190. *Ex* Forskal.

Scarus purpuratus Shaw, Gen. Zool. (Pisces), iv., 2, 1803, 397. *Ex* Forskal.

Julis quadricolor Lesson, Dict. Class. Hist. Nat., xiii., January, 1828, 27. Tahiti. Name only, with reference to a plate then unpublished. *Id.* Lesson, Mem. Soc. Hist. Nat. Paris, iv., September, 1828, 400 and Voy. Coquille, ii., 1831, 139, pl. xxxv., fig. 1 (Tahiti and Bora Bora). *Id.* Bleeker, Atlas Ichth., i., 1862, 93, pl. xxxiv., fig. 3.

Scarus georgii Bennett, Fish. Ceylon (5), 1830, No. 24, pl. xxiv. Ceylon.

- ? *Julis bicatenatus* Bennett, Proc. Comm. Sci. Zool. Soc., London (14), March, 1832, 167. Mauritius.
- Julis semicoeruleus* Rüppell, Neue Wirbelth. Abyssin., Fische (4), 1835, 10, pl. iii., fig. 1. Red Sea.
- Julis umbrostygma* Rüppell, *id. ib.*, fig. 11, pl. iii., fig. 2. Red Sea.
- ?? *Julis aeruginosus* Cuvier & Valenciennes, Hist. Nat. Poiss., xiii., early 1839, 441. Mauritius.
- Julis cyanogaster* Cuvier & Valenciennes, Hist. Nat. Poiss., xiii., early 1839, 444. Tahiti. Ex *Labrus cyanogaster* Solander MS.
- Labrus vittatus* Cuvier & Valenciennes, Hist. Nat. Poiss., xiii., 1839, 445. Ex Forster MS. Tahiti. Not "*Labrus vittatus*" Walbaum, 1792.
- Julis erythrogaster* Cuvier & Valenciennes, Hist. Nat. Poiss., xiii., 1839, 447. Tahiti (type) and Ulea.
- Labrus erythrogaster* Cuvier & Valenciennes, Hist. Nat. Poiss., xiii., 1839, 447. Ex Solander MS. Tahiti
- Labrus formosus* Cuvier & Valenciennes, Hist. Nat. Poiss., xiii., 1839, 447. Ex Forster MS. Tahiti. Not *Julis formosus* Cuv. & Val., *ibid.*, 439. Preoccupied by *Labrus formosus* Bennett, 1830.
- ? *Scarus quinquevittatus* Lay & Bennett, Zool. Blossom, 1839, 66, pl. xix., fig. 1. Loo-Choo.
- Scarus georgii quarti* Bennett, Fish. Ceylon, ed. 3, 1841, No. 24, pl. xxiv. Ceylon—*fide* Sherborn, Index Animalium.
- ? *Julis guntheri* Bleeker, Versl. Kon. Akad. Wet., xiii., 1862, 279 and Atlas Ichth., i., 1862, 94, pl. xxxiv., fig. 1. Celebes.
- Thalassoma immanis* Fowler, Proc. Acad. Nat. Sci. Philad., 1899 (January, 1900), 488, pl. xviii., fig. 2. Thornton Is., Carolines.
- Thalassoma berendti* Seale, Occas. Pap. Bish. Mus., i., 4, 1901, 15, fig. 7. Honolulu. Name emended to *T. berndti* by Jordan & Seale, 1905.
- Julis trilobata* Ogilby, Austr. Mus. Mem., ii., 1889, 68 (Lord Howe Island). Not *Labrus trilobatus* Lacépède.
- Thalassoma trilobatum* Waite, Rec. Austr. Mus., v., 1904, 209. Not *Labrus trilobatus* Lacépède.
- Thalassoma purpureum* Jordan & Seale, Bull. U.S. Bur. Fish., xxv., 1906, 305. *Id.* McCulloch & Waite, Trans. Roy. Soc. S. Austr., xl., 1916, 445 and 454 (Lord Howe and Norfolk Islands). Not *Scarus purpureus* Bonnaterre.
- Julis purpurea* Günther, Journ. Mus. Godeff., vi., 16 (Fische der Sudsee, viii.), 1909, 292, pl. cxlix., fig. A (Friendly Islands, etc.). Not *Scarus purpureus* Bonnaterre.

A gorgeously coloured parrot fish was seen swimming near the wreck of the "Annasona" on Middleton Reef on April 17th, 1936. Unfortunately it evaded capture, but was easily recognisable as a well known Lord Howe and Norfolk Island species which has been recorded from those places as *Julis trilobata* or *Thalassoma trilobatum* and *purpureum*. It is doubtful, however, whether these specific names are applicable, since the typical *Labrus trilobatus* was very briefly described by Lacépède and seems to be a different fish, and Forskal's "*Scarus purpureus*" from the Red Sea is also regarded as distinct by some authors. Under the circumstances, I am using Lesson's name *quadricolor* as his figure agrees quite well with the Philliplian

form, but I have included a number of nominal synonyms in the references given above.

Amongst the Phillip Gidley King papers in the Mitchell Library, Sydney, I have seen a painting of this species of parrot fish labelled "Norfolk Island. Painter unknown. 1793/4". This drawing may have been the work of Thomas Watling (I do not think it is by George Raper), and is probably the first illustration ever made of this parrot fish. It is reproduced here in monochrome, with grateful acknowledgments to the Mitchell Library.

Whilst this species has been recorded from localities as far apart as the Red Sea and Hawaii, Mauritius and Easter Island, it seems likely, so far as I can determine from published figures, that more than one species has been confused and caused the still tangled synonymy.

Family CORIDAE.

Genus *CORIS* Lacépède, 1802.

CORIS CYANEA Macleay.

(Plate xiii., fig. 3.)

? *Coris aygula* Lacépède, Hist. Nat. Poiss., iii., 1802, 96, pl. iv., fig. 1. No locality (Commerson) = Mauritius.

Coris cyanea Macleay, Proc. Linn. Soc. N.S. Wales, vii., April, 1883, 588. New Guinea. Type in Australian Museum seen.

This is the Double Head of the Lord Howe Islanders, a large blue fish which browses over the coral reefs at half-tide, often exposing the back out of water. It was found on Middleton Reef, 17/4/36, and we speared several for food. They lack the lengthened dorsal spine from which the species derived its specific name (*aygula*, an aigrette), bestowed by Lacépède, and since it seems unlikely that our fish is identical with the Mauritius one, I am employing Macleay's name for it, since *cyanea*, so far as I know, is not preoccupied.

D. 9/12; A. 3/12; L. lat. 50 + 12 = 62; L. tr. 9/1/31.

Head (7 inches), 3.7; depth of body ($7\frac{1}{2}$), 3.4; base of dorsals ($13\frac{1}{4}$), 1.9; depth of caudal peduncle ($3\frac{1}{2}$), 7.4 in total length (26).

Family POMACENTRIDAE.

Subfamily GLYPHISODONTINAE.

Genus GLYPHISODON Lacépède, 1802.

GLYPHISODON SEXFASCIATUS (Lacépède).

Labrus sexfasciatus Lacépède, Hist. Nat. Poiss., iii., 1802, 430 and 477, pl. xix., fig. 2. [Indo-Pacific.]

Several specimens were seen swimming near the wreck of the "Annasona" at Middleton Reef, but I was unable to catch any, though I could see the characteristic markings of the caudal fin.

Family ELEOTRIDAE.

Genus *EVIOTA* Jenkins, 1903.

EVIOTA VIRIDIS (Waite).

Allogobius viridis Waite, Rec. Austr. Mus., v., March 11, 1904, 177, pl. xxiii., fig. 3. Lord Howe Island. Types in Austr. Mus., Sydney.

Eviota viridis Whitley, Sci. Rept. Great Barrier Reef Exped., iv., 9, 1932, 301, q.v. for references to literature.

Several specimens (Austr. Mus., Regd. No. IA.6858) from Elizabeth Reef, 15th April, 1936, amongst coral crevices, and others (IA.6864) from similar situations and from pools in the wreck on Middleton Reef, April 17, 1936.

Family SCORPAENIDAE.

Genus SCORPAENODES Bleeker, 1857.

? *Scorpaenopsis* Heckel, Ann. Wiener. Mus., ii. (1), 1839, 158. Two species: *S. neglecta* Heckel and *S. nesogallica* Cuvier & Valenciennes—*vide* Sherborn, Index Animalium. Logotype, *Scorpaena nesogallica* Cuv. & Val., Hist. Nat. Poiss., iv., November, 1829, 315, from Mauritius—*vide* Jordan, Gen. Fish.

Scorpaenichthys Bleeker, Nat. Tijdschr. Ned. Ind., xi., 1856, 385, 388 and 402, *et ibid.* xii., 1856, 213. Virtual haplotype, *Scorpaena polylepis* Bleeker. Name preoccupied by *Scorpaenichthys* Girard, Proc. Acad. Nat. Sci. Philad., vii., 1854, 131, another genus of fishes.

Scorpaenodes Bleeker, Nat. Tijdschr. Ned. Ind., xiii., 1857, 56, 60 and 371. Haplotype, *Scorpaena polylepis* Bleeker, Nat. Tijdschr. Ned. Ind., ii., 1851, 173, from western Sumatra; figured in Atlas Ichth., ix., 1878, pl. ccccxv., fig. 1.

Sebastopsis Gill, Proc. Acad. Nat. Sci. Philad., August, 1862, 278, footnote. Orthotype, *Scorpaena polylepis* Bleeker.

Scorpaena polylepis Bleeker, the genotype of *Scorpaenodes*, was described as having, amongst others, the following characters:—

“altitudine 4 circiter in ejus longitudine . . . spinis suborbitalibus 2 . . . squamis lateribus 35 p.m. in serie longitudinali,” etc., which do not agree with the species described hereunder as *scaber*.

Bleeker's species is commonly regarded as a synonym of *Scorpaena guamensis* Quoy & Gaimard, an identification which is open to doubt. The species called *S. guamensis* from Oceania by most authors is, however, allied to *Sebastes scaber* Ramsay & Ogilby, and records of *scaber* from Samoa, Pelew Island, Philippines, New Hebrides, Fiji and the Society Islands are almost certainly referable to *guamensis*, auctorum, rather than to the true southern *scaber*.

SCORPAENODES SCABER (Ramsay & Ogilby).

Sebastes scaber Ramsay & Ogilby, Proc. Linn. Soc. N.S. Wales, x., 4, April 3, 1886, 577. Shark Reef, Port Jackson, New South Wales. Types (B.8450-51) in Austr. Mus. examined. *Id.* Ogilby, Cat. Fish, N.S. Wales, about August, 1886, 21.

Scorpaena scabra Ogilby, Mem. Austr. Mus., ii., 1889, 60 (Lord Howe Is.).

Sebastopsis scaber Waite, Mem. N.S. Wales Nat. Club, ii., 1904, 47 (N.S. Wales) and Rec. Austr. Mus., v., 1904, 220 (Lord Howe Island). *Id.* McCulloch, Rec. Austr. Mus., ix., 3, May 31, 1913, 387, pl. xiii., fig. 2.

Scorpaenodes scaber McCulloch, Austr. Zool., ii., 3, 1922, 117 and Austr. Mus. Mem., v., 1929, 387.

Br. 7. D. xii., i., 8, the last divided. A. iii/5 (last divided). P. 19. V. i/5. C. 9. 23 to 25 small spines along the course of the lateral line. L. tr. 8/1/16. About five large predorsal scales in largest specimen. 5 + 9 short spiny gill-rakers on first branchial arch.

Head (28 mm.), 2.3; depth (23) 2.8 in standard length (65). Eye, 8 mm. Snout, 7. Interorbital, 3. Fifth dorsal spine, 9. Second anal spine, 12. Pectoral, 20. Depth of caudal peduncle, 7.

Head almost entirely covered with small scales which degenerate anteriorly to be replaced by upstanding papillae which even extend over the eye. Maxillary very broadly rounded, without ridges. Broad bands of villiform teeth on jaws and vomer. No teeth on palatines. Anterior nostril with a bifid flap; posterior with a circular rim. A spine near each pair of nostrils. Preorbital with incipient spines only. Three supraorbital spines followed by a large and a small spine just behind. Three spines between orbital series and lateral line. Two on each side of the nape. Three or four suborbital and three or four preopercular spines. Two opercular and one scapular spines. Interorbital sunken. Nuchal region not excavated. Gill openings wide. Some large mucus pores around chin.

Mandible with a symphysial knob fitting into a gap in the upper jaw. Tongue well developed, its tip rounded. Velum maxillare present.

Body covered with large ctenoid scales, which ascend in oblique series above the lateral line and in horizontal series below it. Some of the spines on the head have a produced membrane, but there are no prominent leaf-like dermal appendages on the body. There is a minute orbital tentacle.

Dorsal fin with thirteen spines, bearing prickles on their anterior surfaces, the fifth to ninth longest.

Second anal spine longer and stronger than the third. Lower pectoral rays simple but not free. Caudal rounded.

General colour in alcohol dark brown with irregular blackish mottling, most dusky on opercles and tending to form crossbands on body posteriorly. Fins whitish, but densely overlain by the dark spots or mottling. Pectoral axil with a few large irregular brown blotches.

Described from a specimen, 65 mm. in standard length or $3\frac{1}{4}$ inches over all.

Two specimens of this species were collected on Middleton Reef by poisoning the pools in the hull of the "Annasona" wreck with chloride of lime, April 17, 1936. Austr. Mus., Regd. Nos. IA.6865 and 6866. The smaller one has 9 dorsal rays and 18 pectoral rays. In life it was largely reddish in colour.

This species was well figured by McCulloch in 1913.

The Australian Museum has specimens from Lord Howe Island and the coast of New South Wales from Newcastle southward to Bermagui.

Family SARDIDAE.

WANDERER, *gen. nov.*

Orthotype, *W. wallisi*, *nov.*

Thynnichthys Giglioli, Espos. Int. Pesca, Berlin, 1880, Elenco, 25. Orthotype, *Thynnus thunnina* Cuvier & Valenciennes—*vide* Jordan, Gen. Fish., iii., 1919, 402. Name preoccupied by *Thynnichthys* Bleeker, Nat. Tijdschr. Ned. Ind., xx., 1859, 433, a genus of Cyprinid fishes.

The Little Tunny, generally known as *Euthynnus alletteratus* (sic) (Rafinesque) deserves a generic name to distinguish it from the Bonito or true *Euthynnus (pelamis)*, of which *Katsuwonus* is a synonym. Giglioli provided *Thynnichthys* for this purpose, but unfortunately his name is preoccupied, hence the new nomination proposed here. *Wanderer* is of course named after the schooner which took members of the expedition to the Middleton and Elizabeth Reefs, but it is doubly appropriate for this fish which is essentially a nomadic species.

Since the European species, *Wanderer alletteratus* (Rafinesque), differs at sight from its Australian representative, I name the latter as a new species and designate it as the orthotype of my new genus. For references

to literature dealing with extralimital specimens, consult Miss Corwin's "Bibliography of the Tunas", Fish Bulletin 22, of the Division of Fish and Game, California, published in 1930. Australian citations are tabulated hereunder.

WANDERER WALLISI, *sp. nov.*

(Plate xiv., fig. 3.)

- Thynnus affinis* Macleay, Proc. Linn. Soc. N.S. Wales, v., 4, May 20, 1881, 556; Cat. Austr. Fish., i., 1881, 191 (Port Jackson, N.S.W.—specimen in Austr. Mus.). *Id.* Tenison-Woods, Fish. Fisher. N.S. Wales, 1882, 18. Not *T. affinis* Cantor, Journ. Asiat. Soc. Bengal, xviii., 1849 (December, 1850), 1088, from the Sea of Penang; the name preoccupied by *T. affinis* Guerin-Meneville, 1838, a species of insect.
- Thynnus thunnina* Ogilby, Rept. Comm. Fisher, N.S. Wales, 1886, 29. Not *T. thunnina* Cuvier & Valenciennes, Hist. Nat. Poiss., viii., "1831" = January, 1832, 104, pl. ccxii., from Mediterranean, etc.
- Gymnosarda alletterata* Waite, Mem. N.S. Wales Nat. Club, ii., 1904, 42 (N.S. Wales). *Id.* Stead, Edib. Fish. N.S. Wales, 1908, 95. *Id.* McCulloch, Rec. Austr. Mus., xi., 7, 1917, 183. Not *Scomber allitteratus* Rafinesque, Carat. n. gen., 1810, 46, from Palermo.
- Euthynnus alletterata* McCulloch, Austr. Zoologist, ii., 3, 1922, 105 and Austr. Zool. Handbook, i., 1922, 79.
- Euthynnus allitteratus* McCulloch, Austr. Mus. Mem., v., 1929, 262.

Mr. Wallis caught a Little Tunny with rod and line on an automatic striker off the North Brother Mountain, N.S. Wales, May 2, 1936, at 4 p.m. The head has been preserved (Austr. Mus., Regd. No. IA.6870) and the following characters were noted from the fresh specimen.

D. xv/11/8; A. 12/7; last finlets smallest. Dimensions in inches: Head, 5; eye, $\frac{3}{4}$; depth of body, $4\frac{1}{2}$; anterior dorsal spine, 3; base of first dorsal, $4\frac{3}{4}$; interdorsal space, 1; pectoral, $3\frac{1}{4}$; length to end of middle caudal rays, $18\frac{3}{4}$. Gill-rakers 9 + 23 in number on first gill-arch. Teeth on jaws and palatines, but not on vomer.

Body with small scales confined to its anterior portion or along the commencement of the single lateral line, which descends fairly evenly and is hardly waved below the dorsal fins. Pectoral fin short. Dorsal and anal lobes low. Caudal peduncle with a median keel.

Colour.—Blue above, with navy to green iridescence. Twelve or more dark grey oblique bands superiorly. Snout and fins greyish. All finlets smoky or greyish. Pupil of eye black; iris silvery. No markings on the silvery lower half of the body, except for two or three dark round blotches below pectorals. Inner surface of pectoral blackish, also part of inner surface of the otherwise white ventrals.

The stomach contained larval crabs and young Gurnards (*Dactyloptena volitans* C. & V.). Surface of liver not striated. Air-bladder absent. Long, thin, ribbon-like, pinkish testes.

Differs from Kishinouye's figure of *Euthynnus yaito* in having stripes instead of blotches superiorly, and is further distinguished by its lack of vomerine teeth. The form of the colour-markings also separate it from the figures of specimens of *allitteratus* given by Cuvier & Valenciennes, Günther, Day, Jordan & Evermann, and others.

Since the "Wanderer" specimen was not preserved in its entirety, I am selecting a specimen (Austr. Mus., Regd. No. IA.3474) from the Sydney fish markets as holotype of the new species.

This holotype agrees closely with the above description, having the following characters:—D. xv/12/8; A. 12/7, last finlets smallest. Head, 4.8 inches. Snout, 1.4. Eye, 0.7. Depth, 4.4. Interdorsal space, 0.7. Pectoral, 3. Length to end of middle caudal rays, 18.4. Gill-rakers 9 + 23. Pseudo-branchiae present. Five prominent dark blotches on each side below the pectoral fin.

A few other species of fishes were obtained during the *Wanderer* trip, both at Lord Howe Island and off the coast of New South Wales, but they hardly call for special mention here. It is, however, of interest to consider the geographical distribution of the species found on the Middleton and Elizabeth Reefs, which is as follows:—

(E. = Elizabeth Reef, M. = Middleton Reef, L. = Lord Howe I., Q. = Queensland.)

(1) *Galeolamnoides macrurus* is known from E., M., L., N.S. Wales, Q., and Southern Australia. (2) *Galeocerdo rayneri*, from M., L., N.S. Wales, Q., New Zealand. (3) *Synodus (Newtonscottia) houlti*, from E., L., and Q. (4) *Gymnothorax flavimarginatus annasona*, from M., L., Norfolk Island and Q., with its typical subspecies from Oceania, East Indies and Red Sea. (5) *Epinephelus forsythi*, from E., M., and L., and probably represented in Norfolk Island and Queensland. (6) *Arripis trutta*, from E., M., L., Norfolk Island, Kermadecs, N.S. Wales, New Zealand, and Southern Australia. (7) *Usacaranx insulanorum*, from E. and L. (8) *Regificola grandis*, from E., M., L., N.S. Wales, Q., New Zealand and Southern Australia. (9) *Lutjanus coatesi* is so far only known from Elizabeth Reef and North Queensland. (10) *Iredalella cyanea*, common at E., M., L., Norfolk Island and Kermadecs, but rare or perhaps extinct in New South Wales. (11) *Thalassoma lunare*, from M., L., Norfolk Island; a rare visitor to N.S. Wales, but occurs in Q., Oceania, and East Indies. (12) *Thalassoma quadricolor*, from M., L., and Norfolk Island, also Oceania and East Indies, but doubtfully identical with forms from the Red Sea and Mauritius. (13) *Coris aygula cyanea*, from M., L., Q., Norfolk Island, Oceania, East Indies, allied to the typical subspecies from Mauritius. (14) *Glyphisodon sexfasciatus*, from M., L., Norfolk Island, Queensland, Oceania, East Indies. (15) *Eviota viridis*, from M., L., Norfolk Island, with subspecies in Queensland and Oceania. (16) *Scorpaenodes scaber*, from M., L., and New South Wales (rare), allied to a form with more northern distribution in Oceania.

This analysis demonstrates that the ichthyofauna of the Middleton and Elizabeth Reefs is most closely allied to that of Lord Howe and Norfolk Islands, and therefore enters the Phillipian Province, but there is an infusion of tropical reef forms similar to those of the Indo-Pacific; these, however, are in the minority, and may have peopled the reefs by medium of the diverse currents which converge on them.
